Montpelier Underfoot

Sean Beckett
North Branch Nature Center
Sean@NorthBranchNatureCenter.org

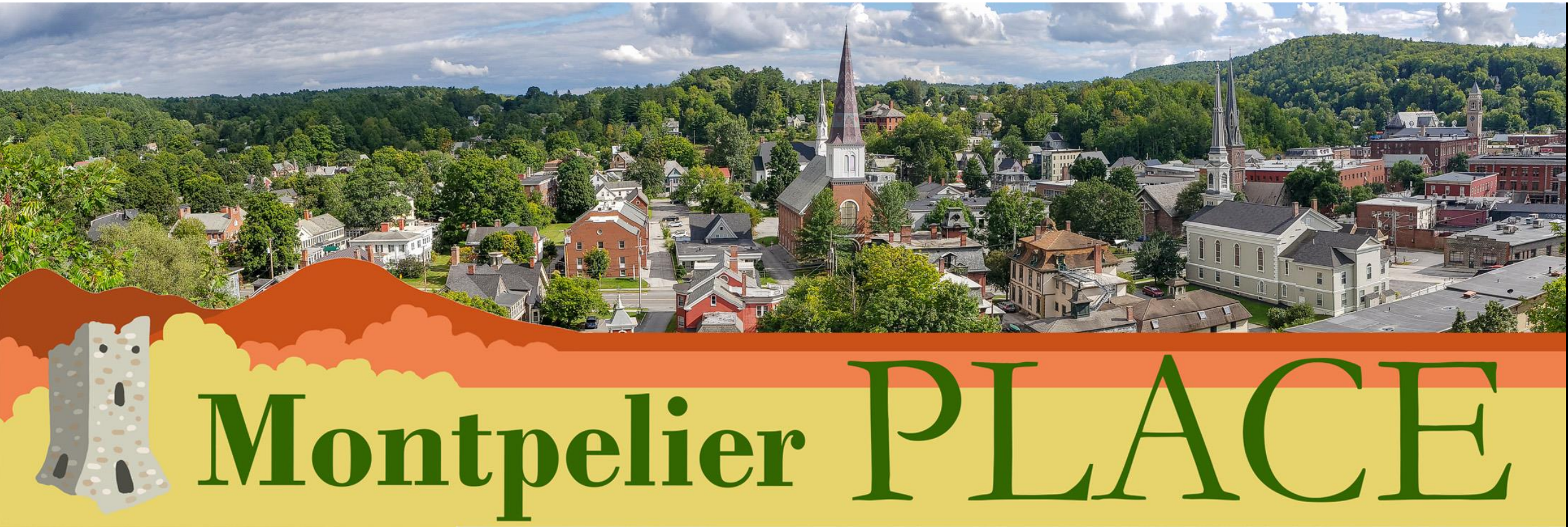
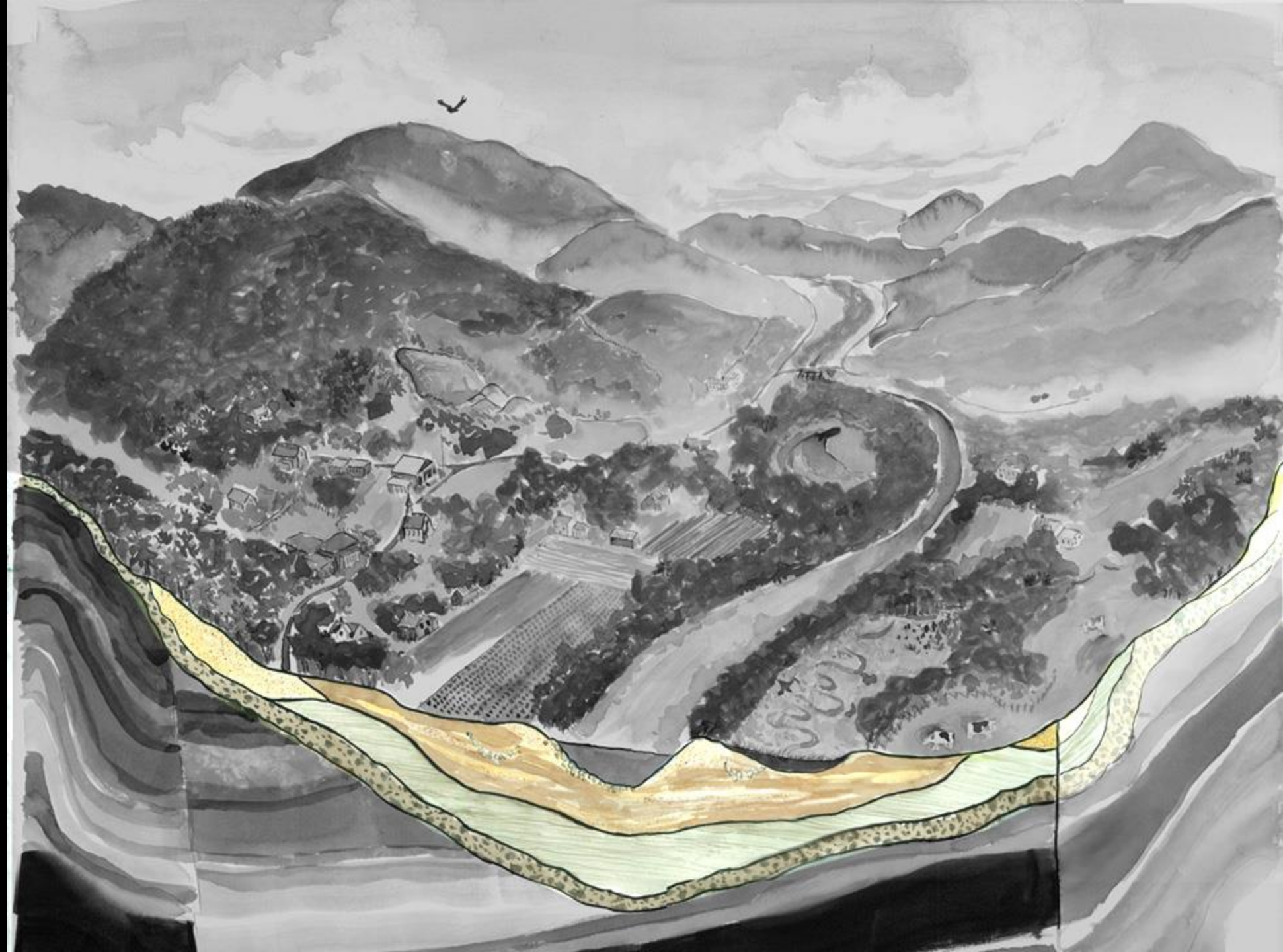
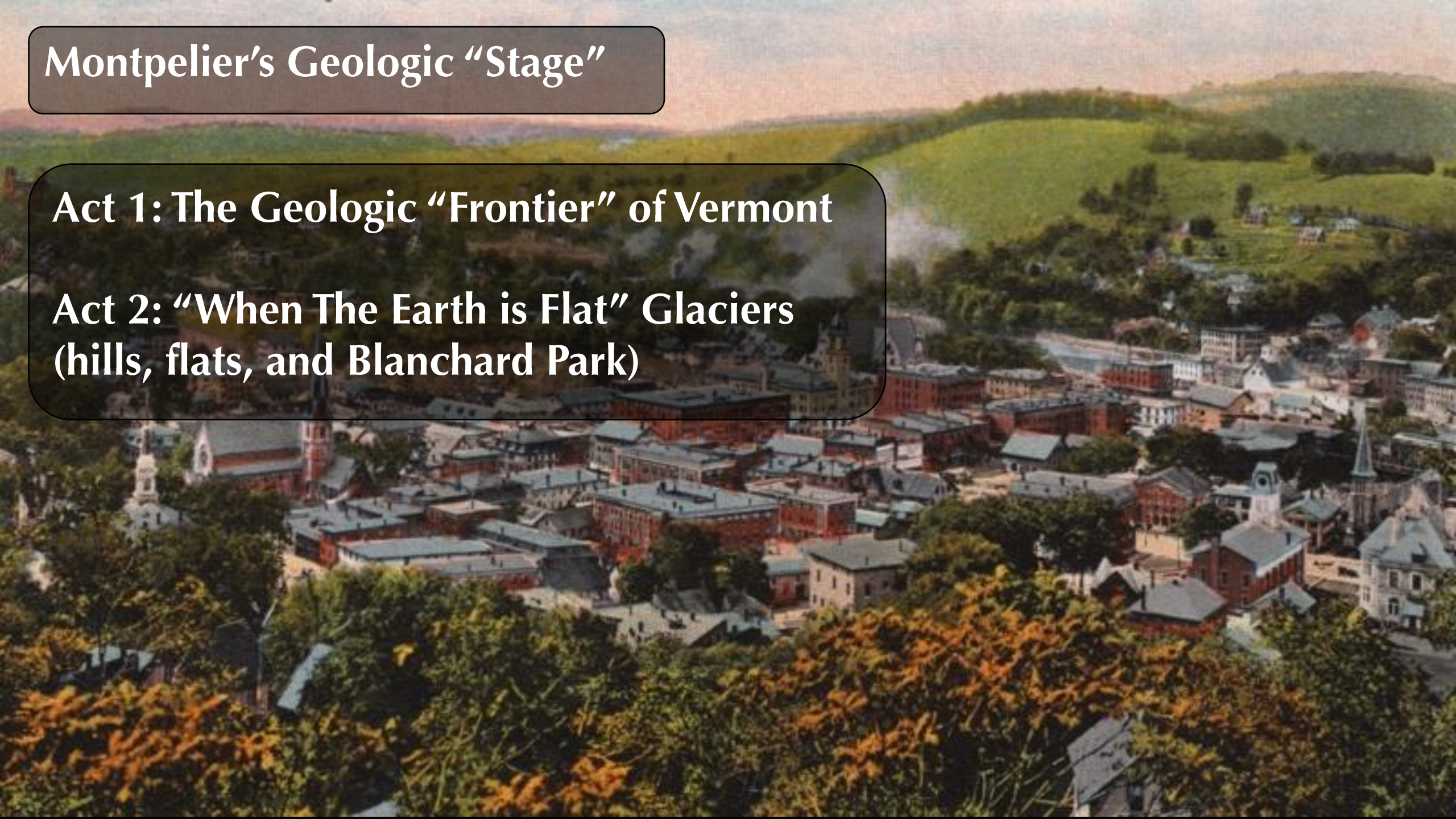


Illustration by
Claire Dacey

Geology is:
1) Bedrock

Geology is:
2) Surficial Stuff
(Glacier Junk)

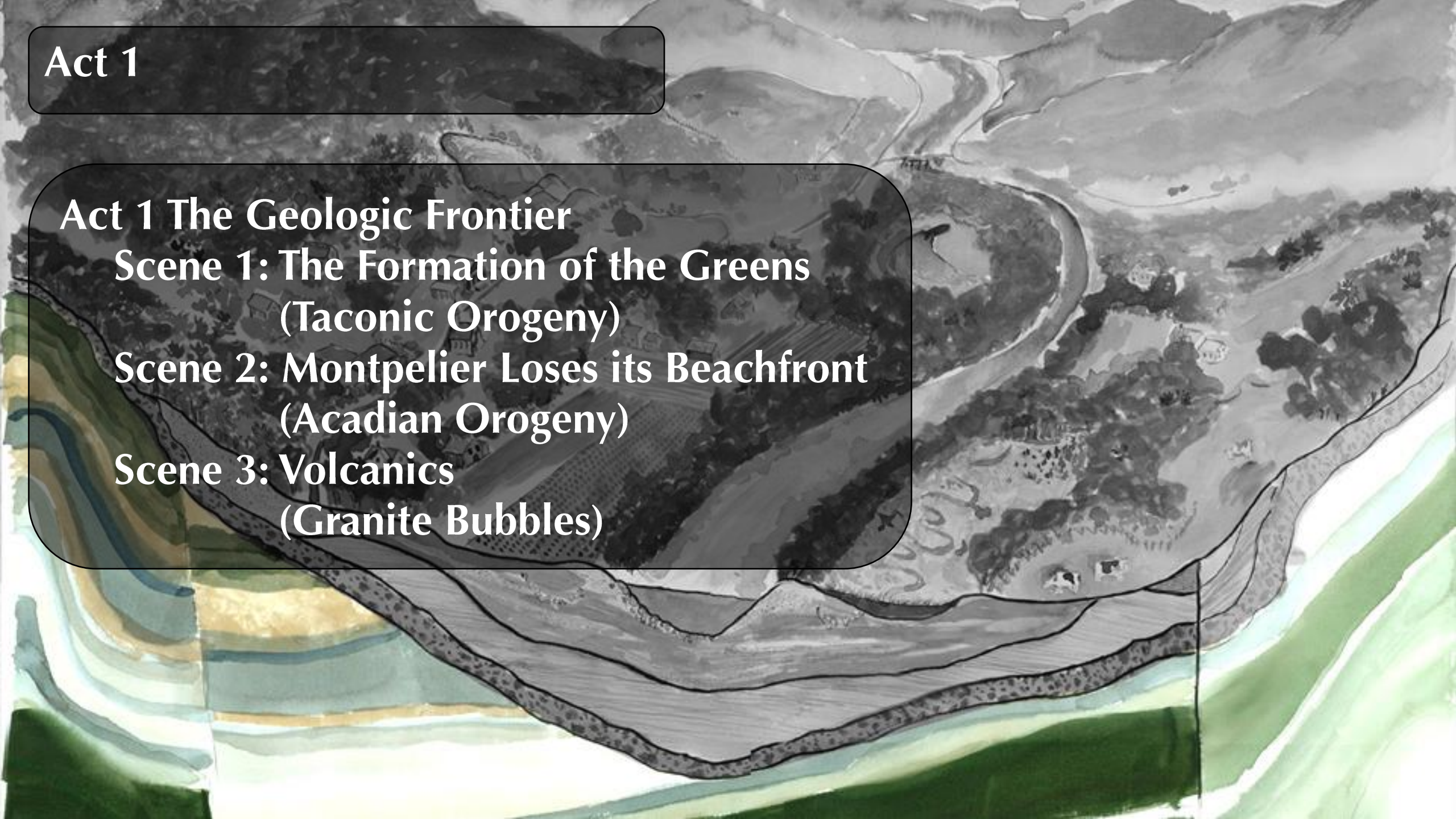




Montpelier's Geologic "Stage"

Act 1: The Geologic "Frontier" of Vermont

Act 2: "When The Earth is Flat" Glaciers
(hills, flats, and Blanchard Park)



Act 1

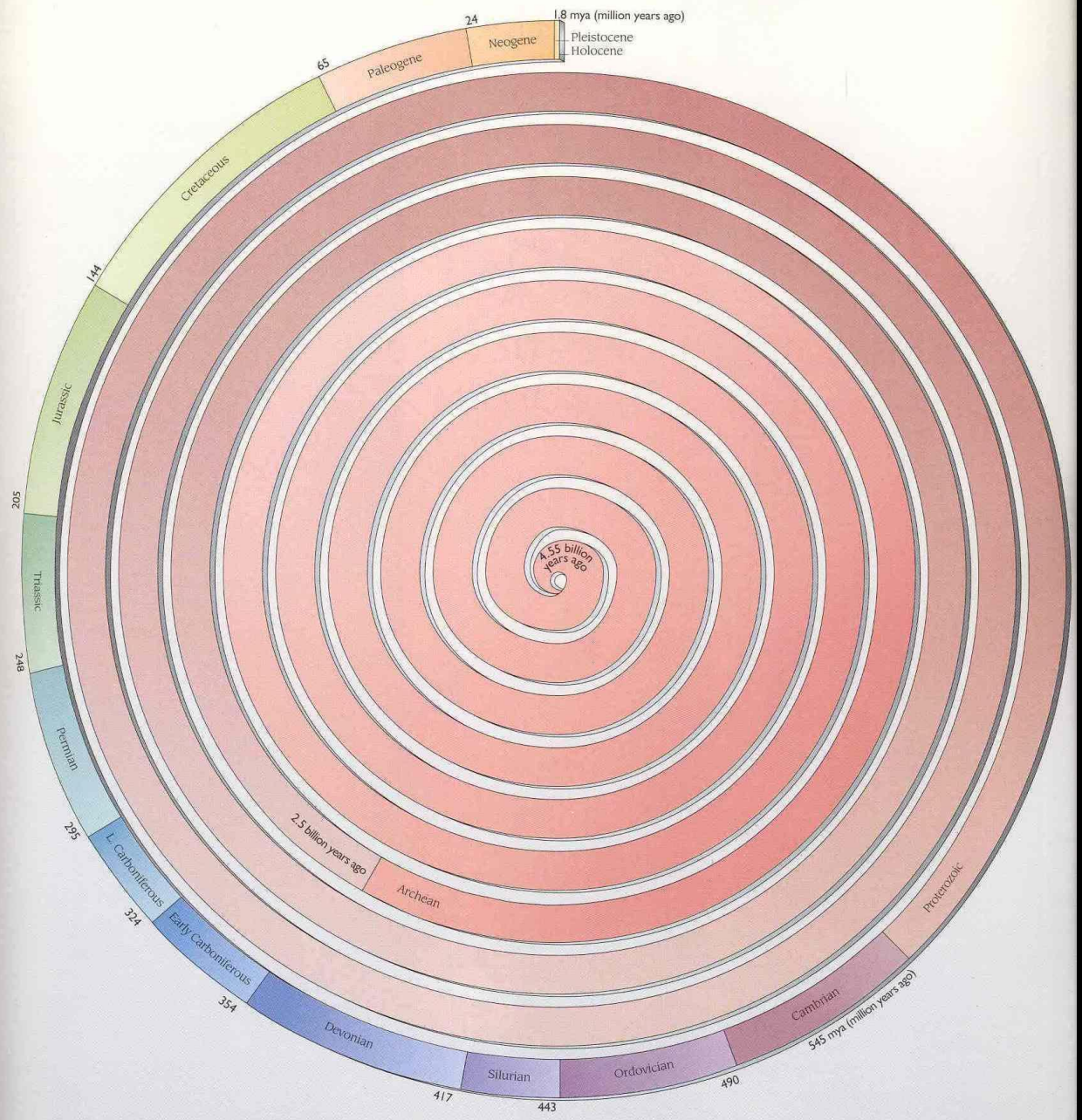
Act 1 The Geologic Frontier

Scene 1: The Formation of the Greens
(Taconic Orogeny)

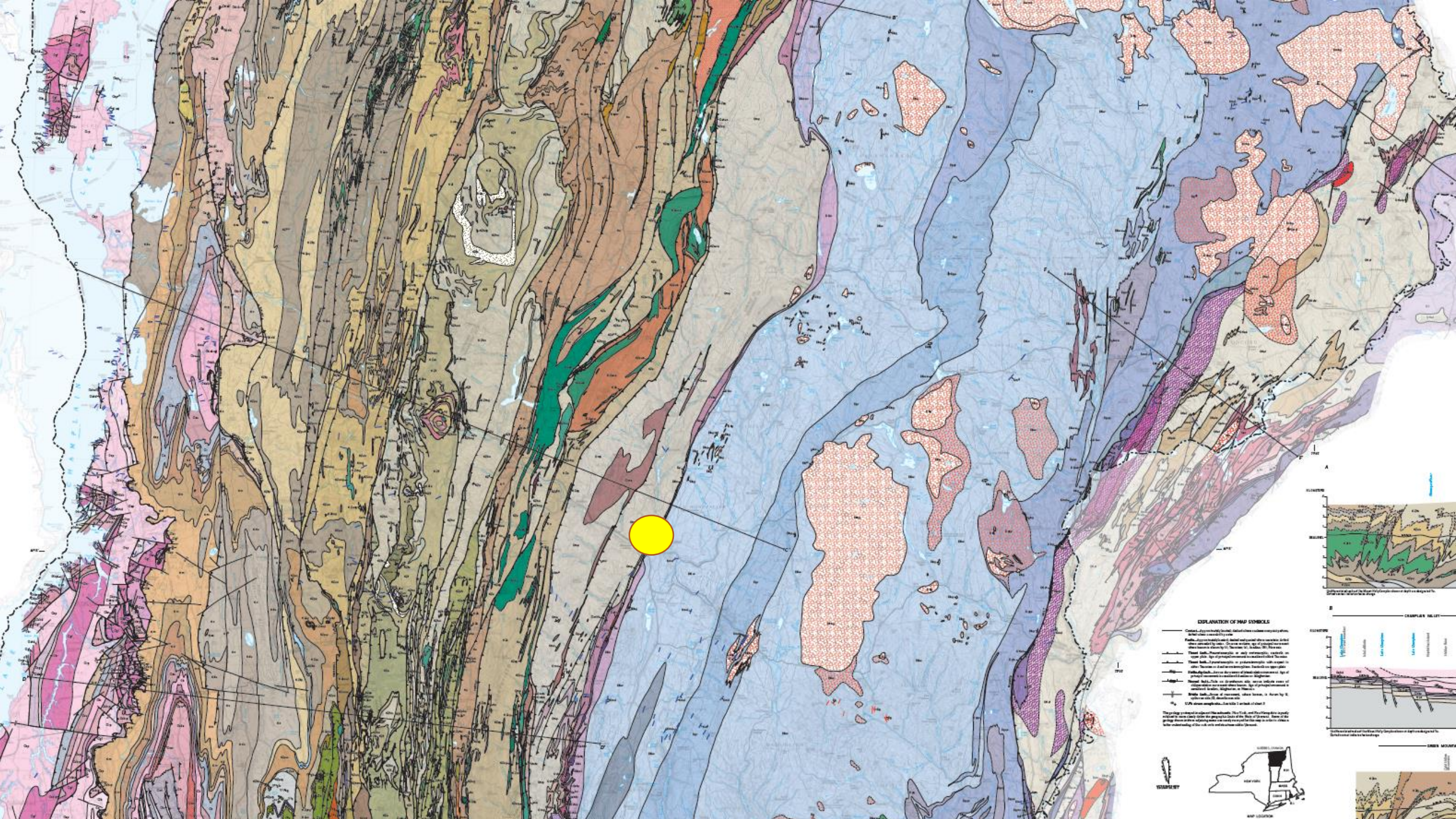
Scene 2: Montpelier Loses its Beachfront
(Acadian Orogeny)

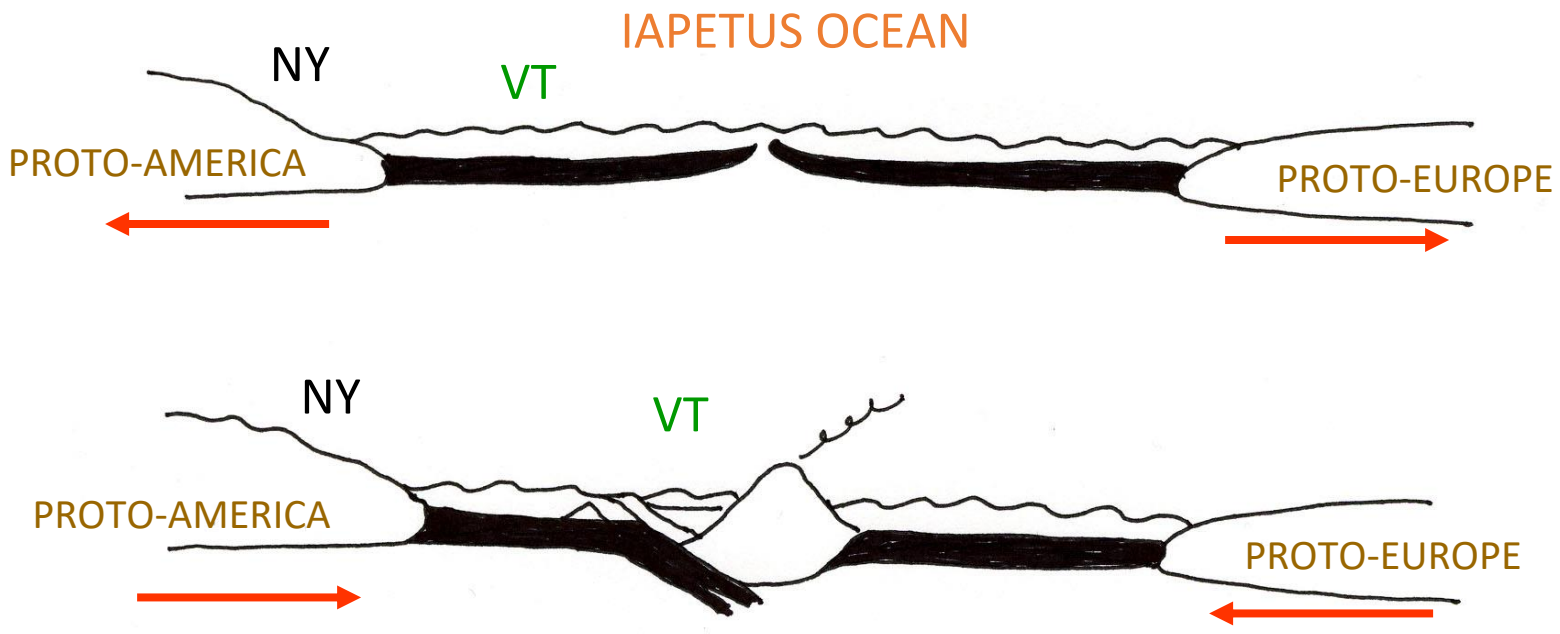
Scene 3: Volcanics
(Granite Bubbles)

THE GEOLOGICAL TIMESCALE

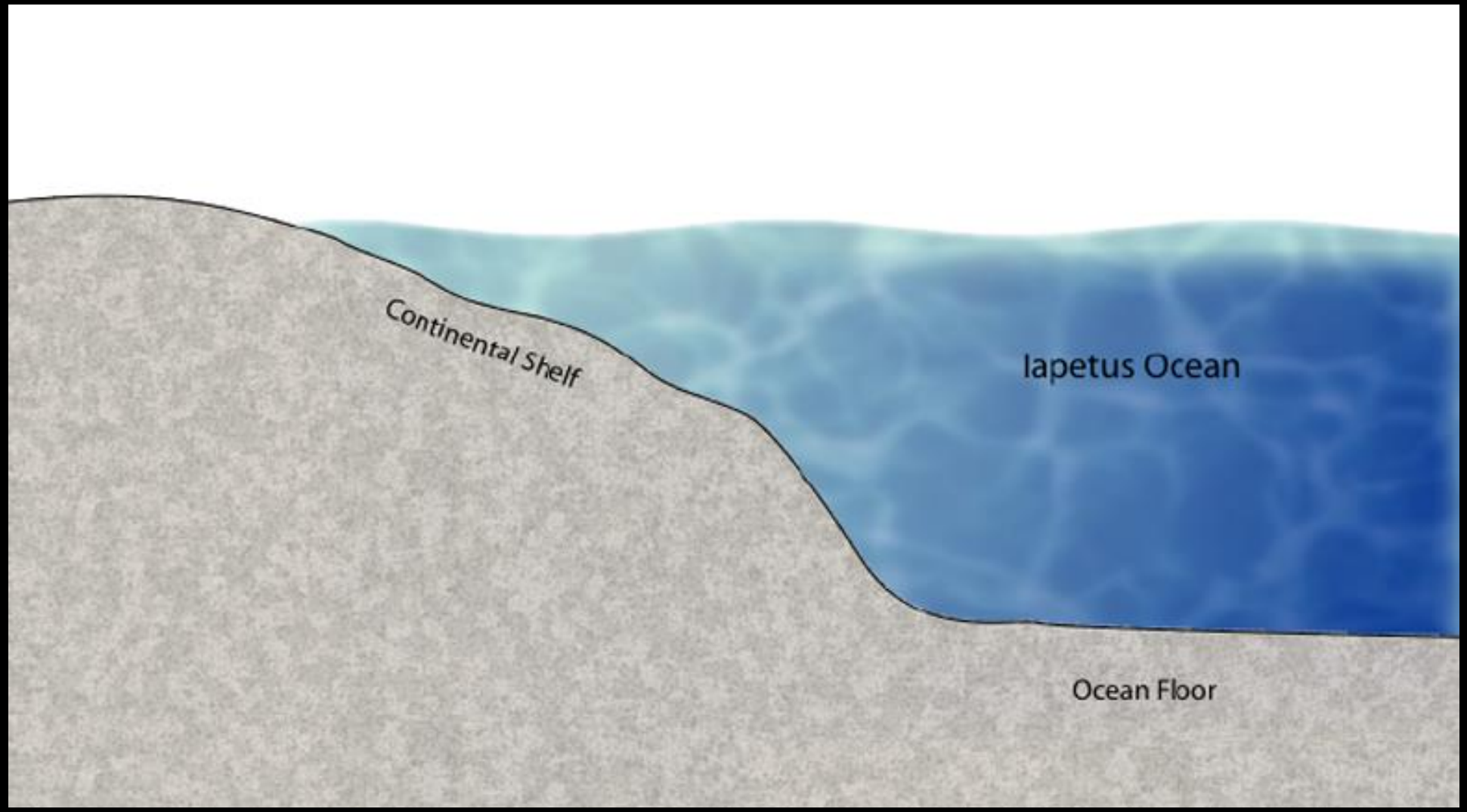


420
Silurian

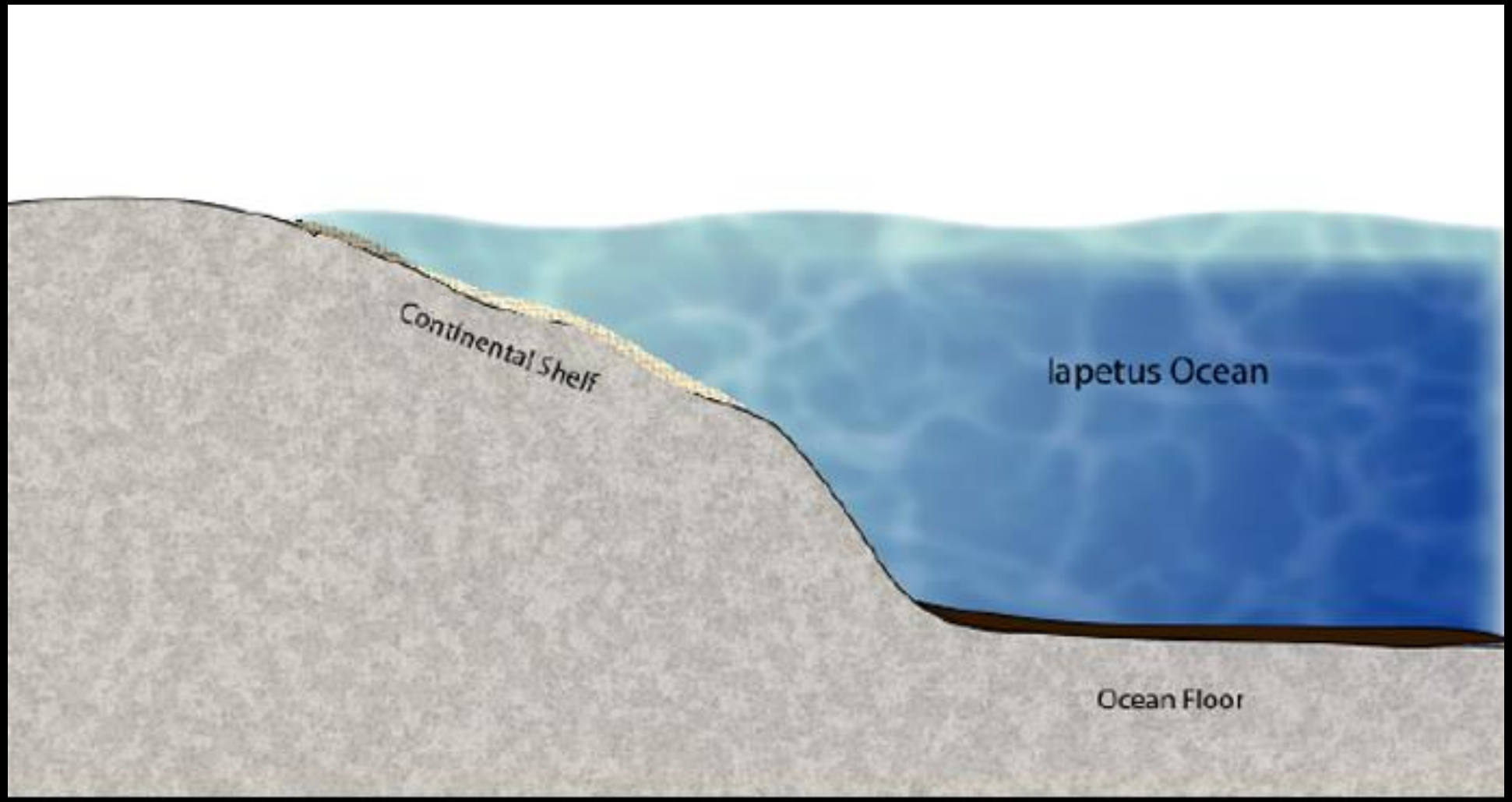

EXPLANATION OF MAP SYMBOLS
CHAMPLAIN VALLEY
GREEN MOUNTAINS
MAP LOCATION


IAPETUS OCEAN
NY
VT
PROTO-AMERICA
PROTO-EUROPE
NY
VT
PROTO-AMERICA
PROTO-EUROPE

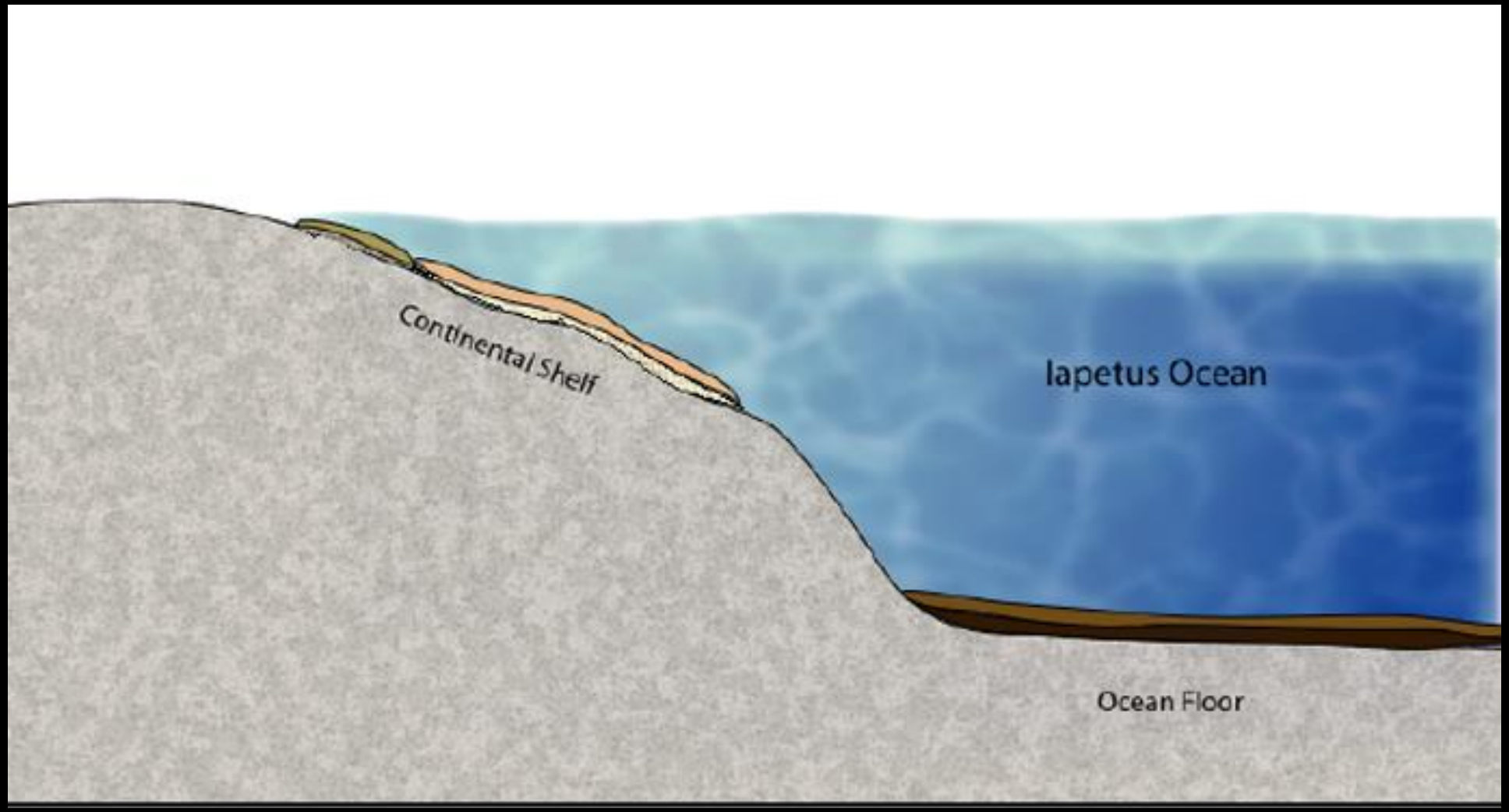
~600 Million Years Ago



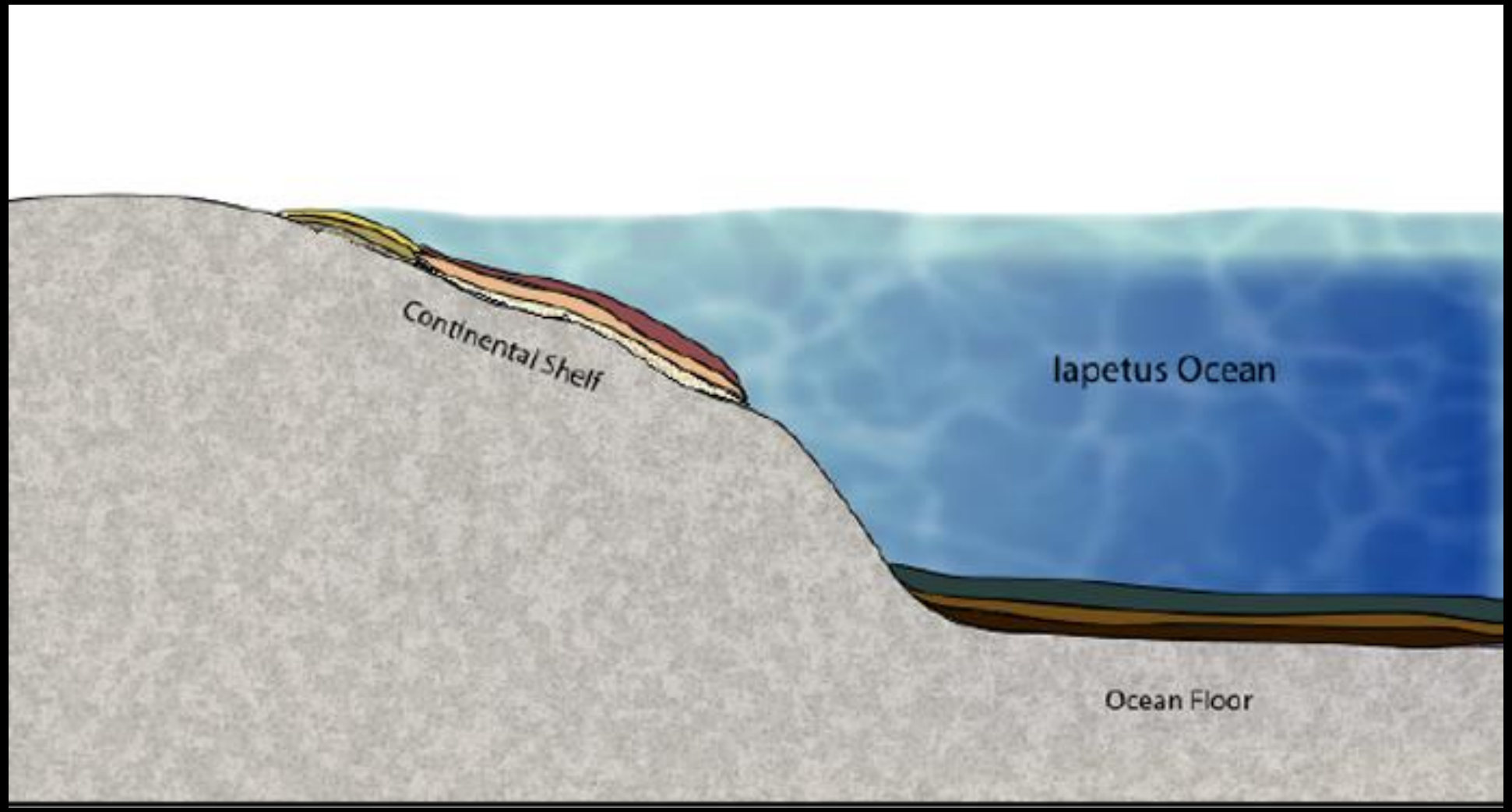
~600 Million Years Ago



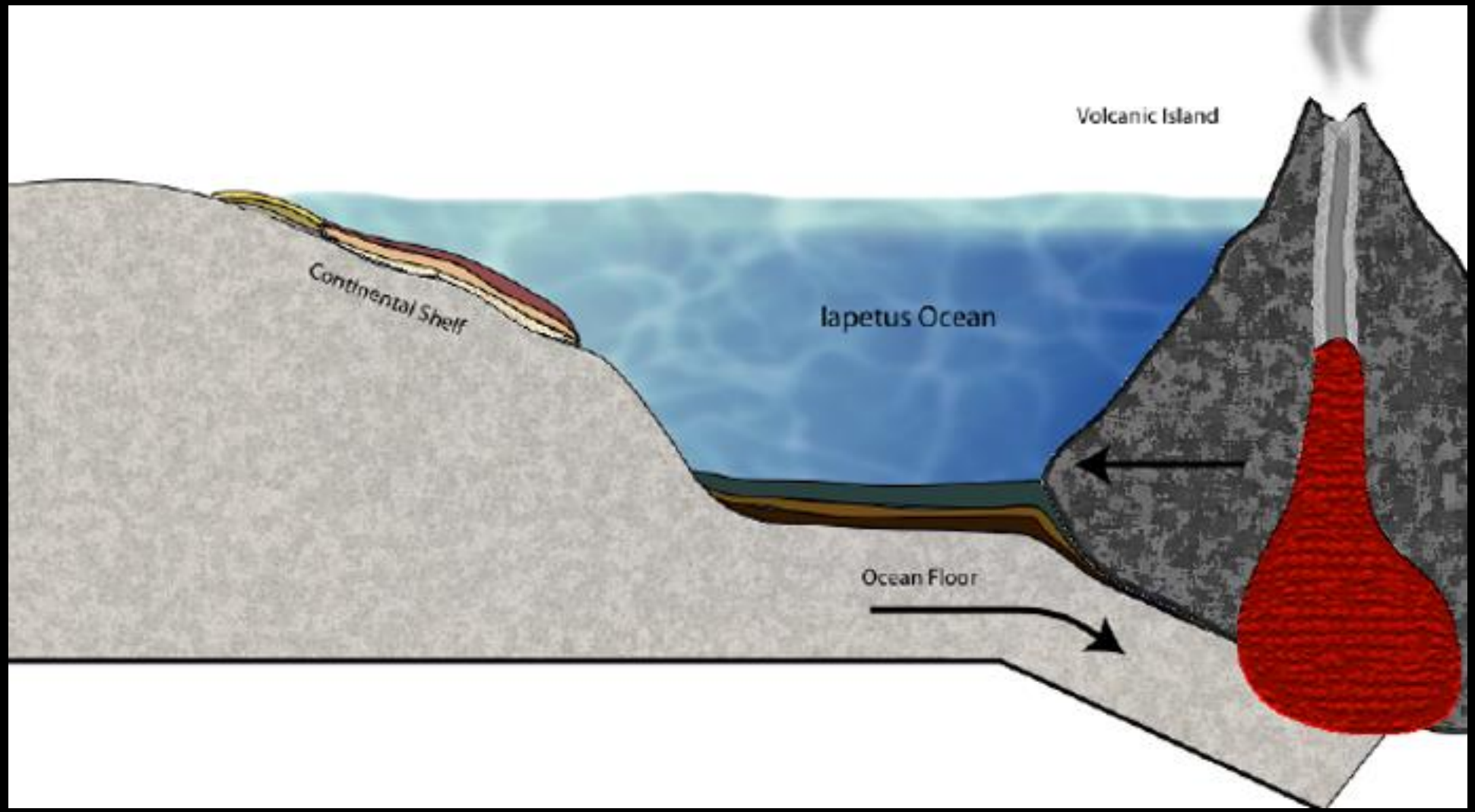
~600 Million Years Ago



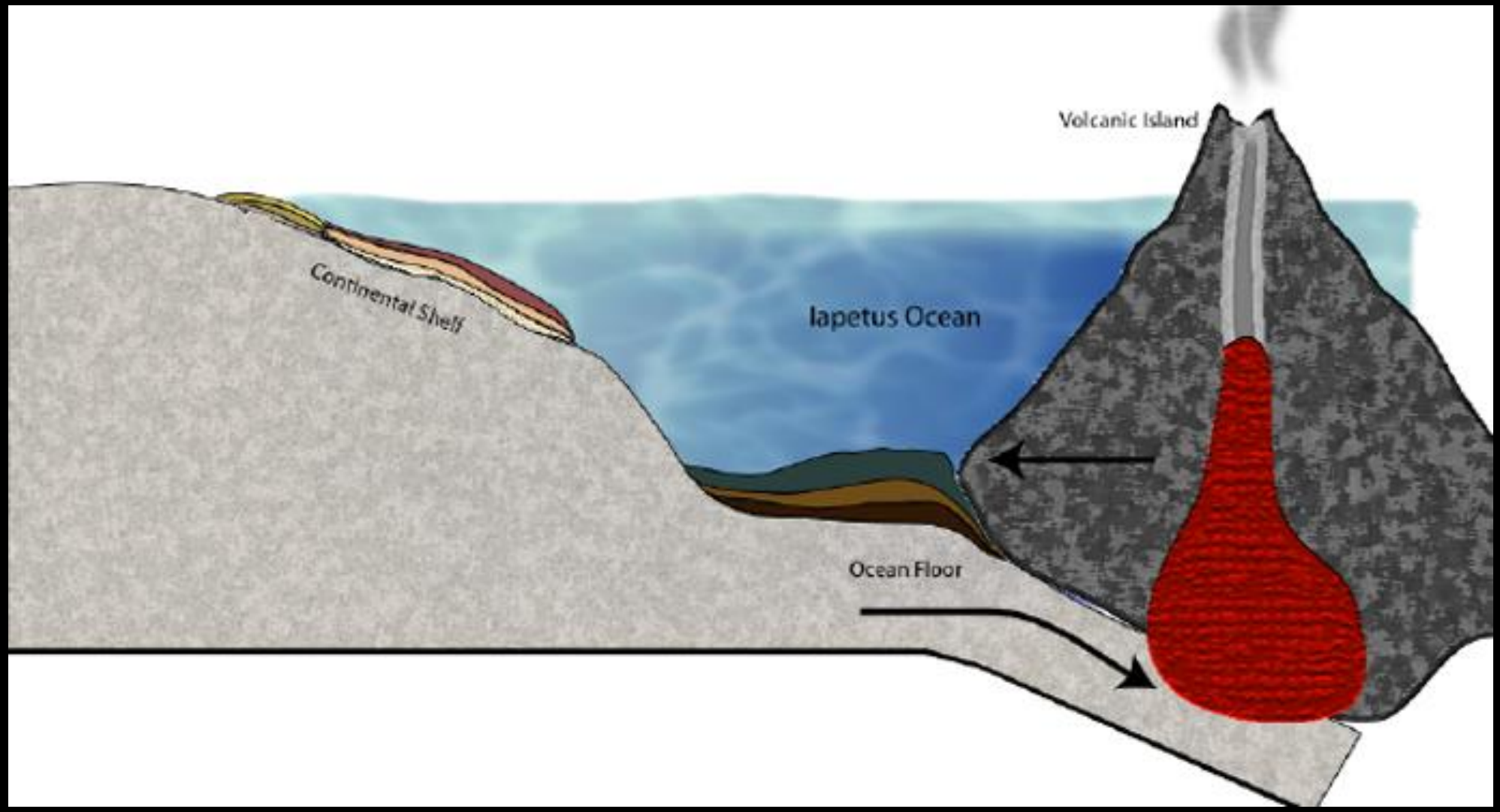
~600 Million Years Ago



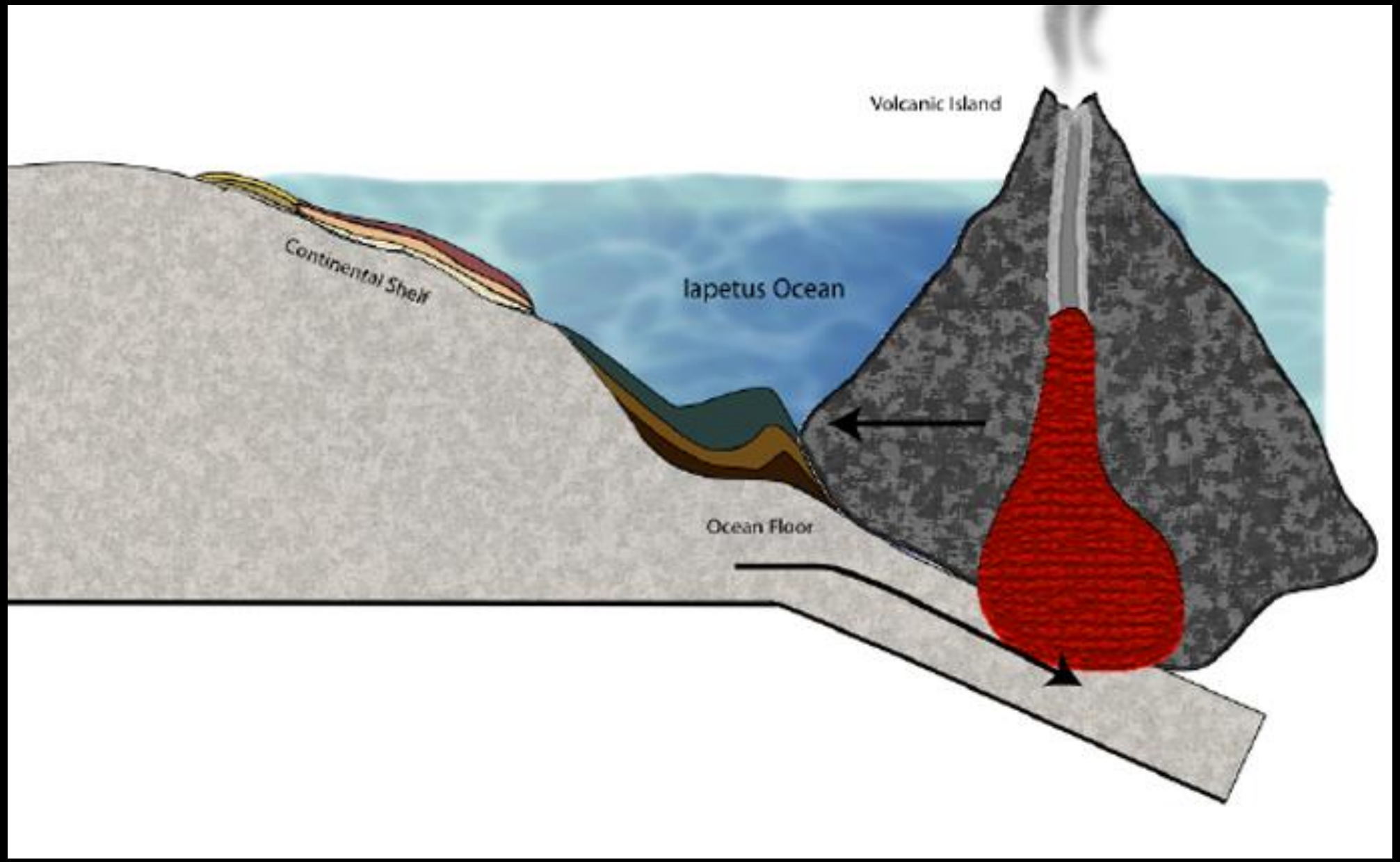
~500 Million Years Ago



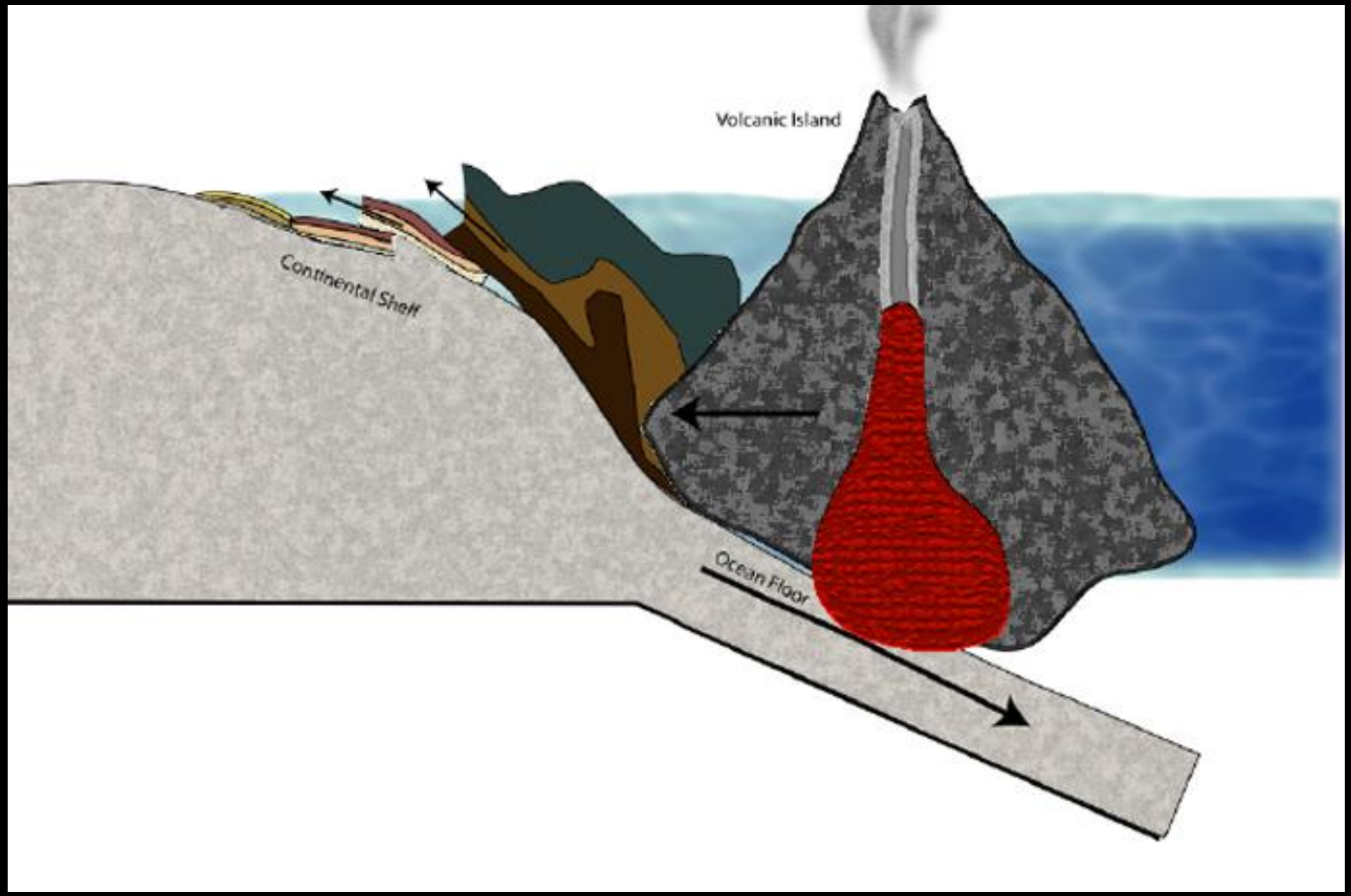
~500 Million Years Ago

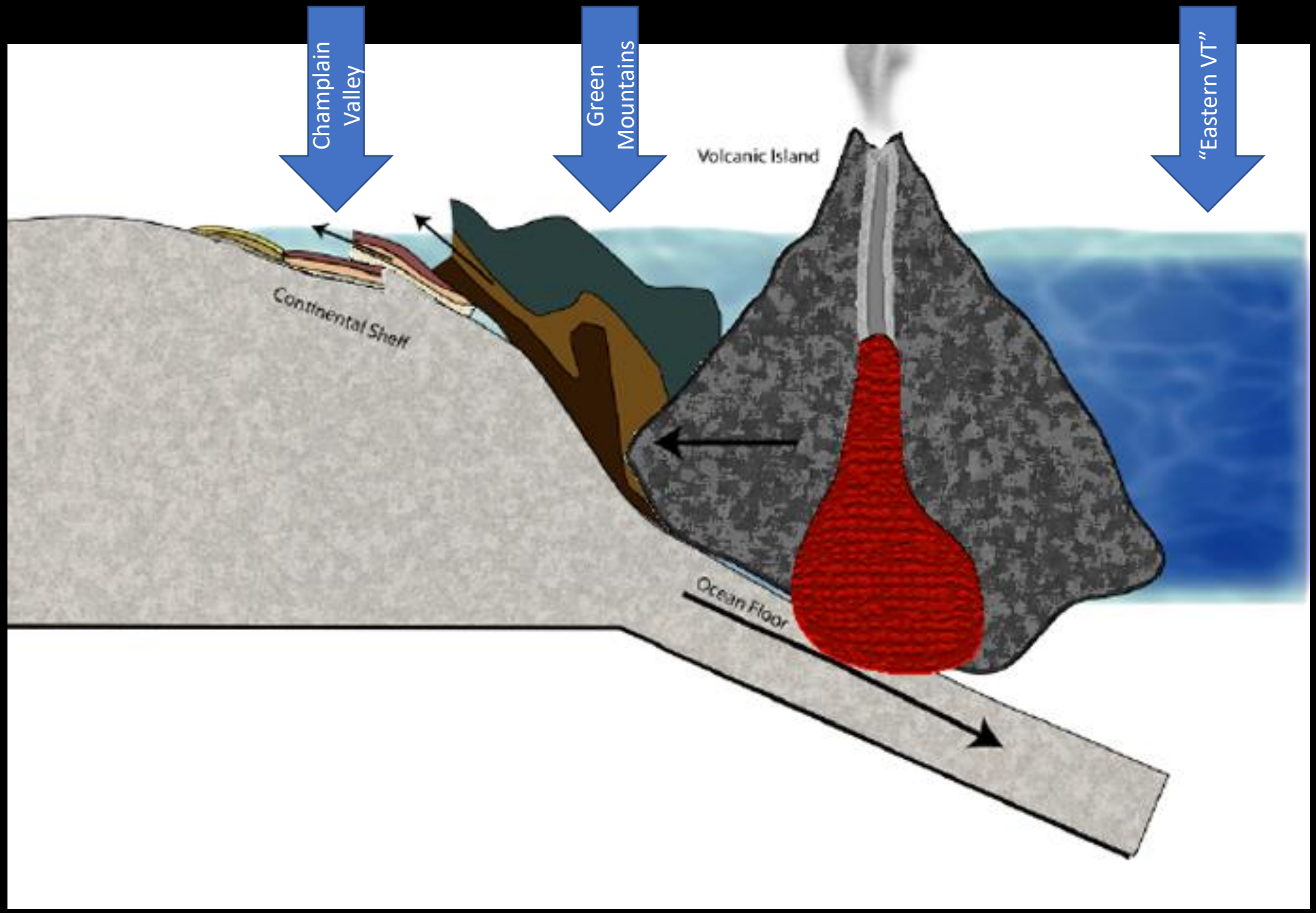


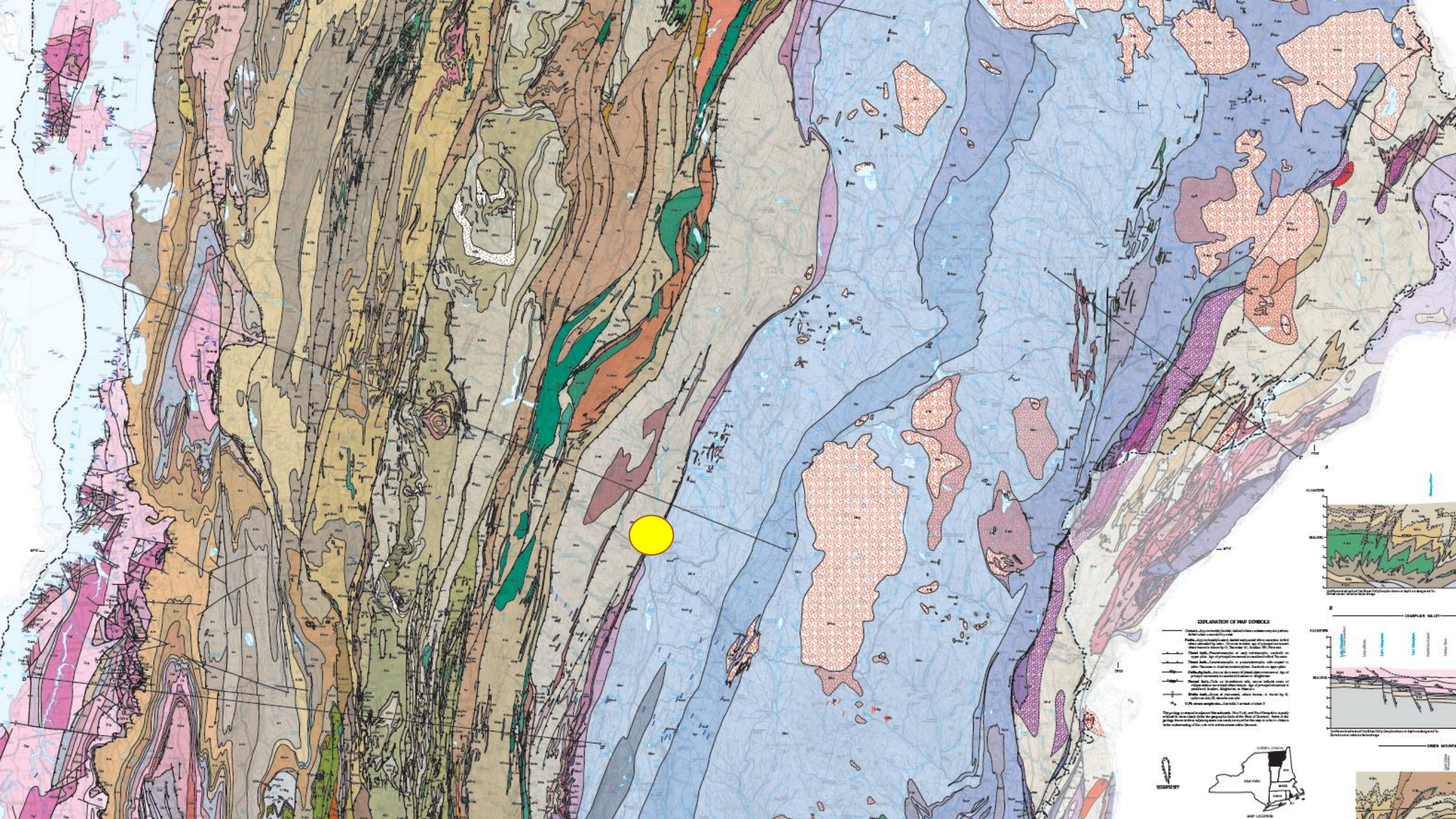
~470 Million Years Ago



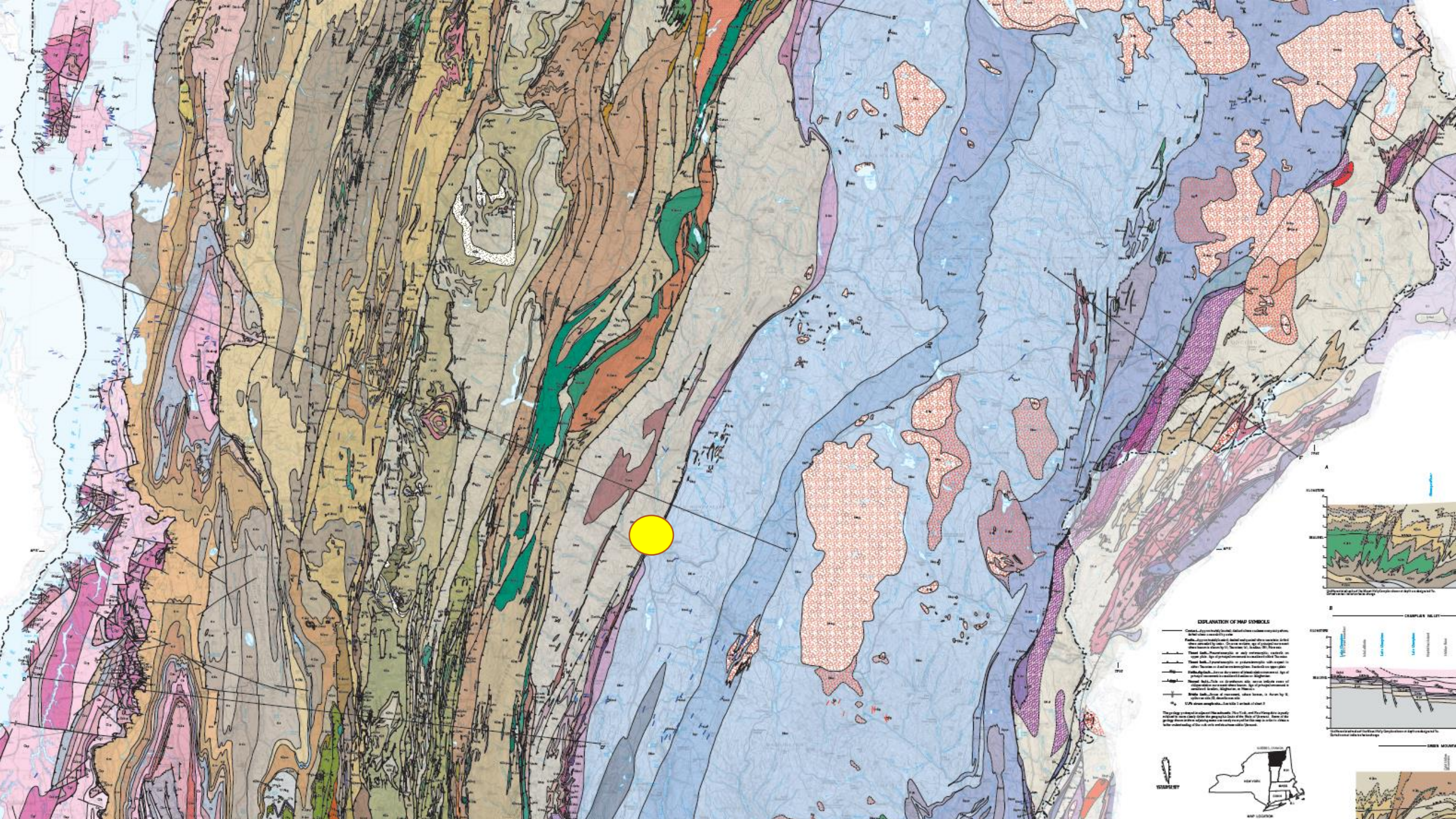
~450 Million Years Ago




Champlain Valley
Green Mountains
"Eastern VT"
Volcanic Island
Continental Shelf
Ocean Floor


EXPLANATION OF MAP SYMBOLS
CHAMPLAIN VALLEY
GREEN MOUNTAINS
MAP LOCATION

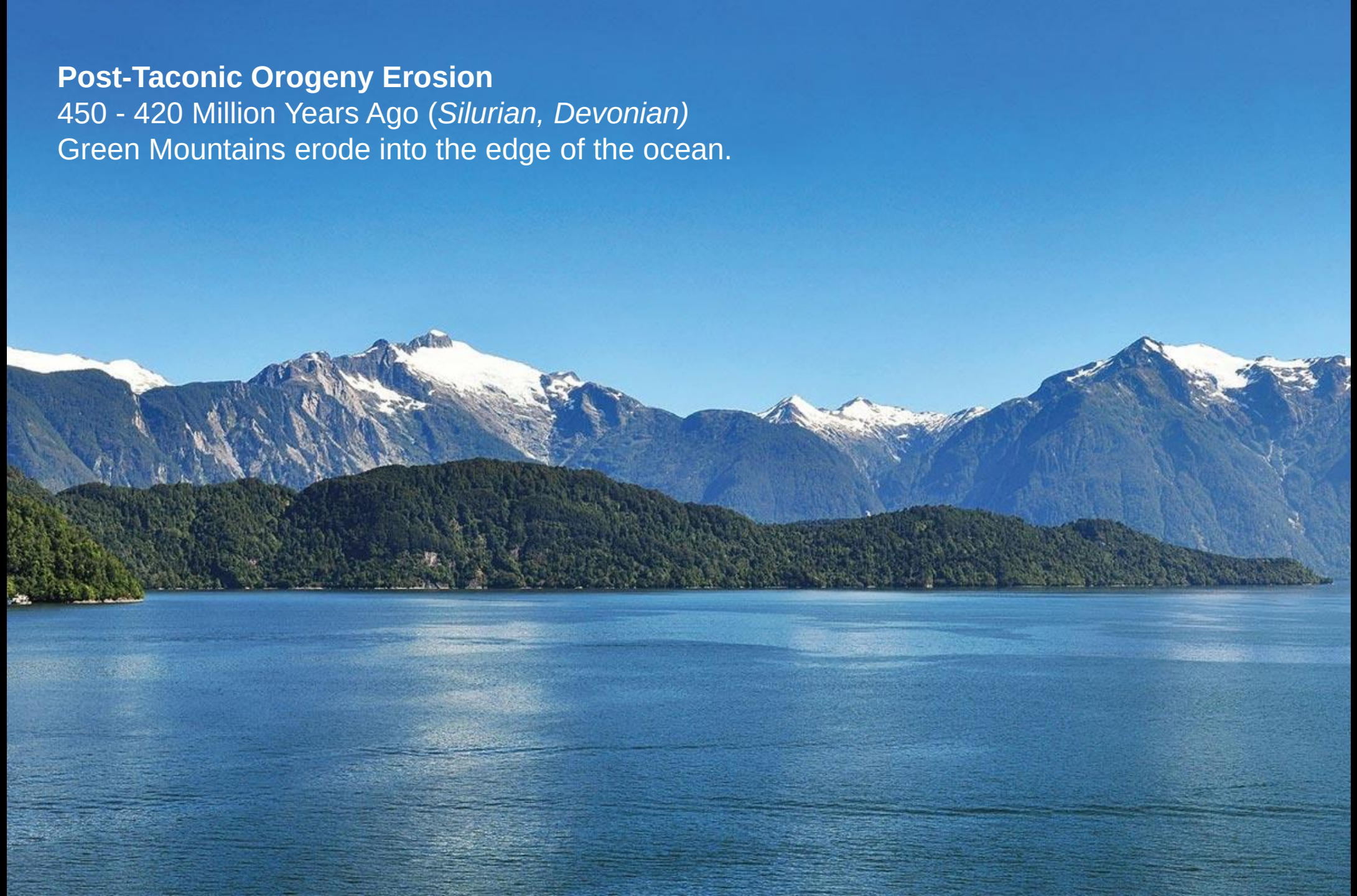
Taconic Orogeny: Schists and Phyllites (metamorphosed mudstone)
Sediment Source: Ancient mud/clays accumulating in deep water far from shore
Moretown Formation

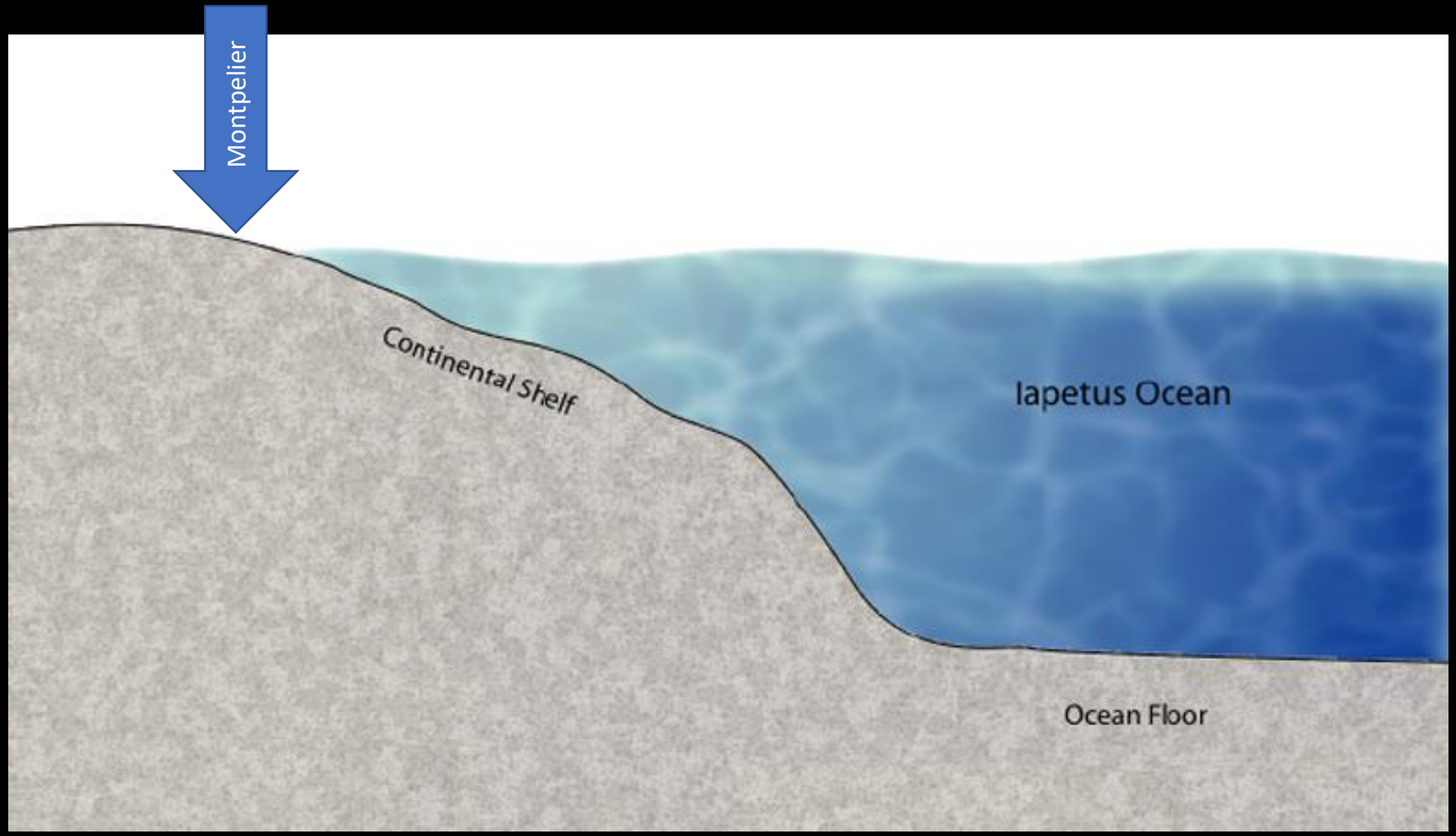

EXPLANATION OF MAP SYMBOLS
CHAMPLAIN VALLEY
GREEN MOUNTAINS
MAP LOCATION

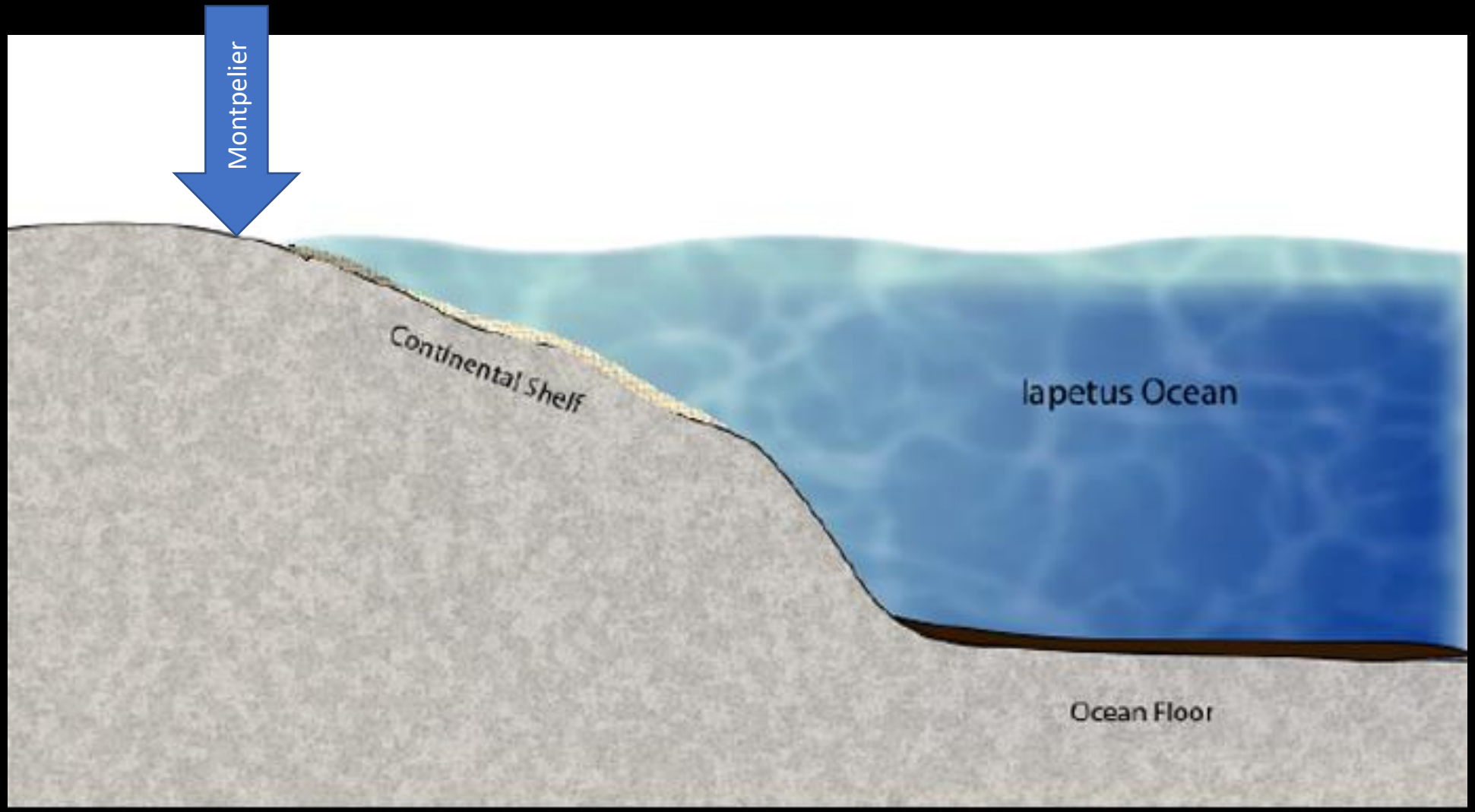
Post-Taconic Orogeny Erosion

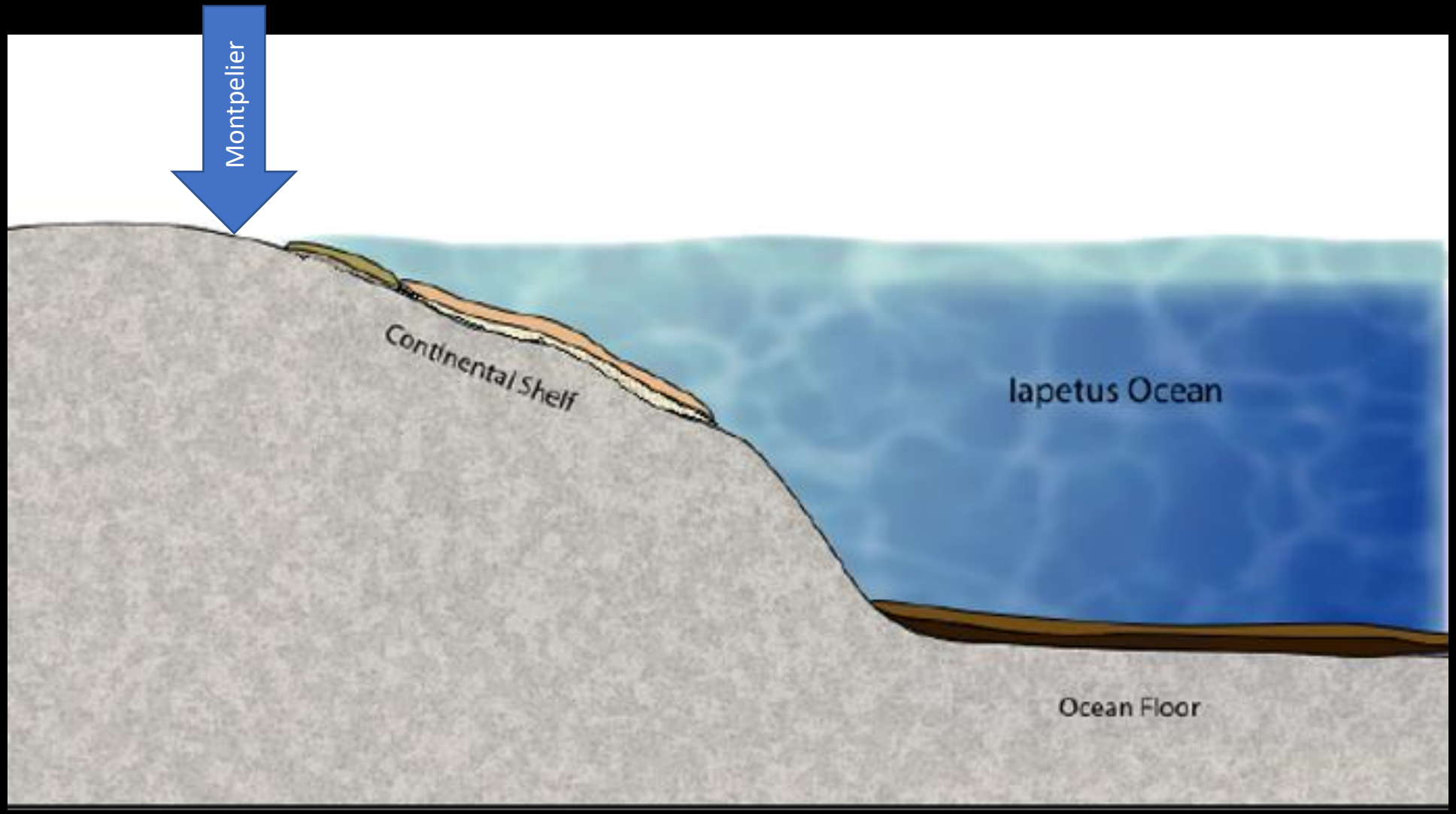
450 - 420 Million Years Ago (*Silurian, Devonian)*

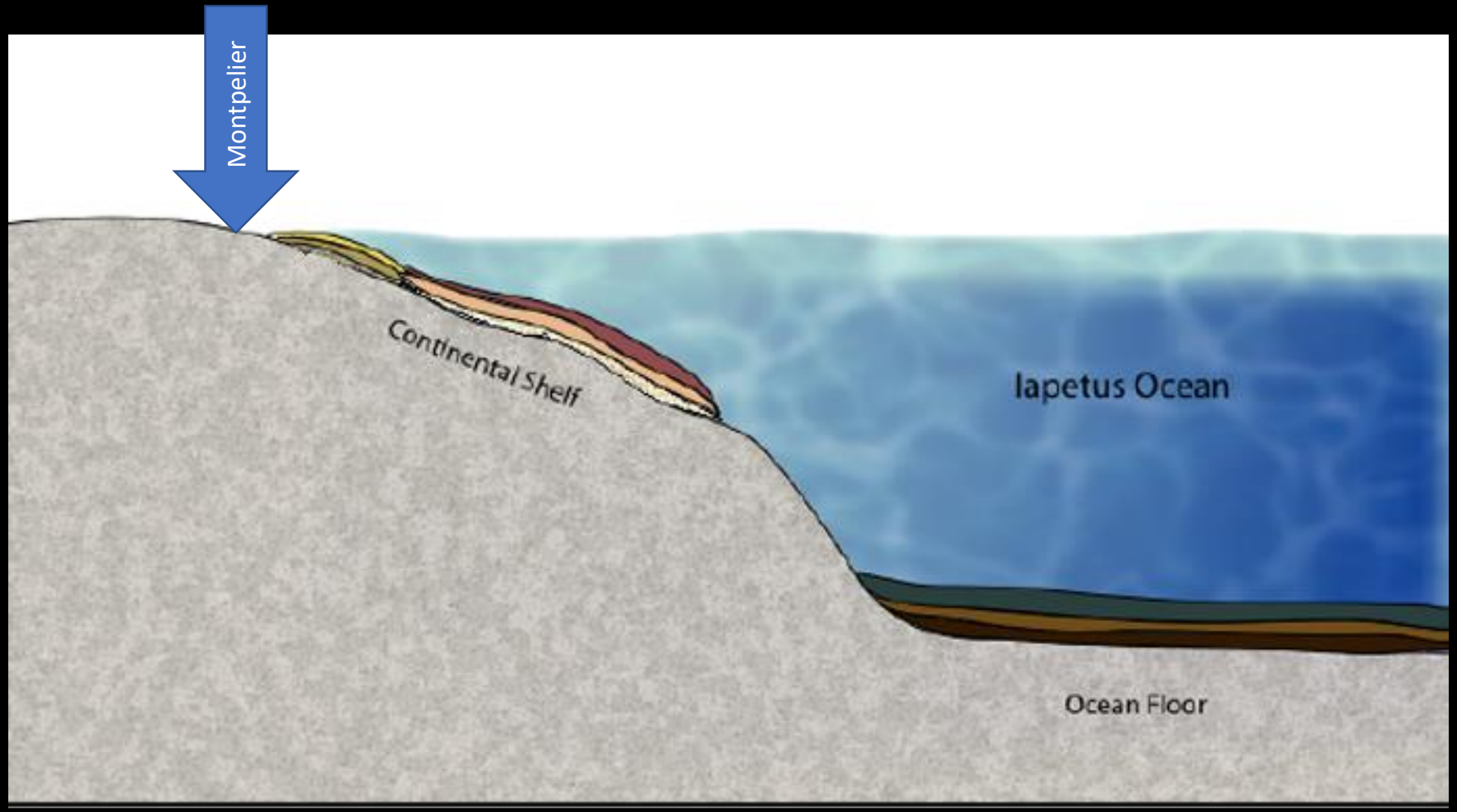
Green Mountains erode into the edge of the ocean.




Montpelier
Continental Shelf
Iapetus Ocean
Ocean Floor


Montpelier
Continental Shelf
Iapetus Ocean
Ocean Floor

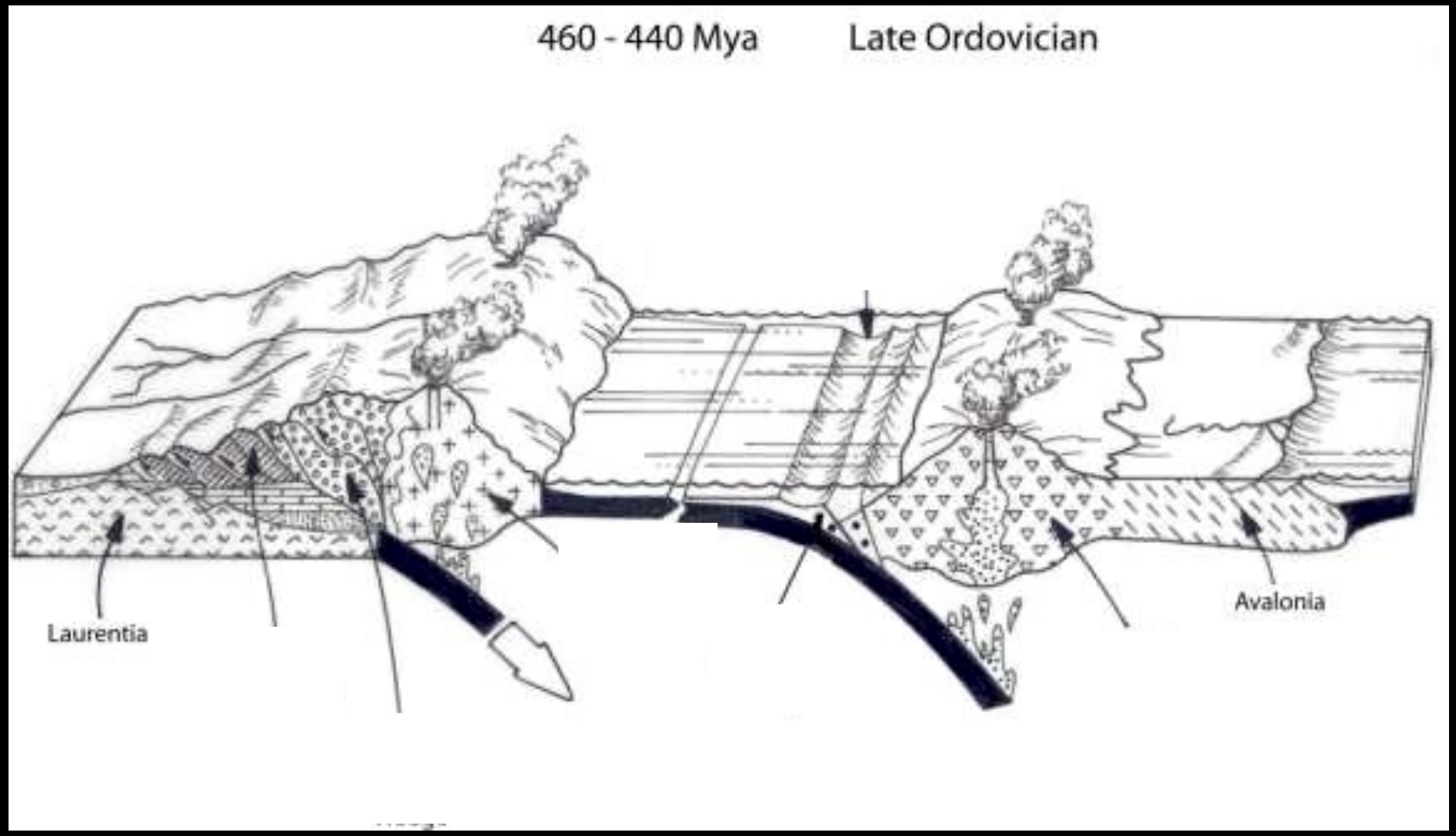

Montpelier
Continental Shelf
Iapetus Ocean
Ocean Floor

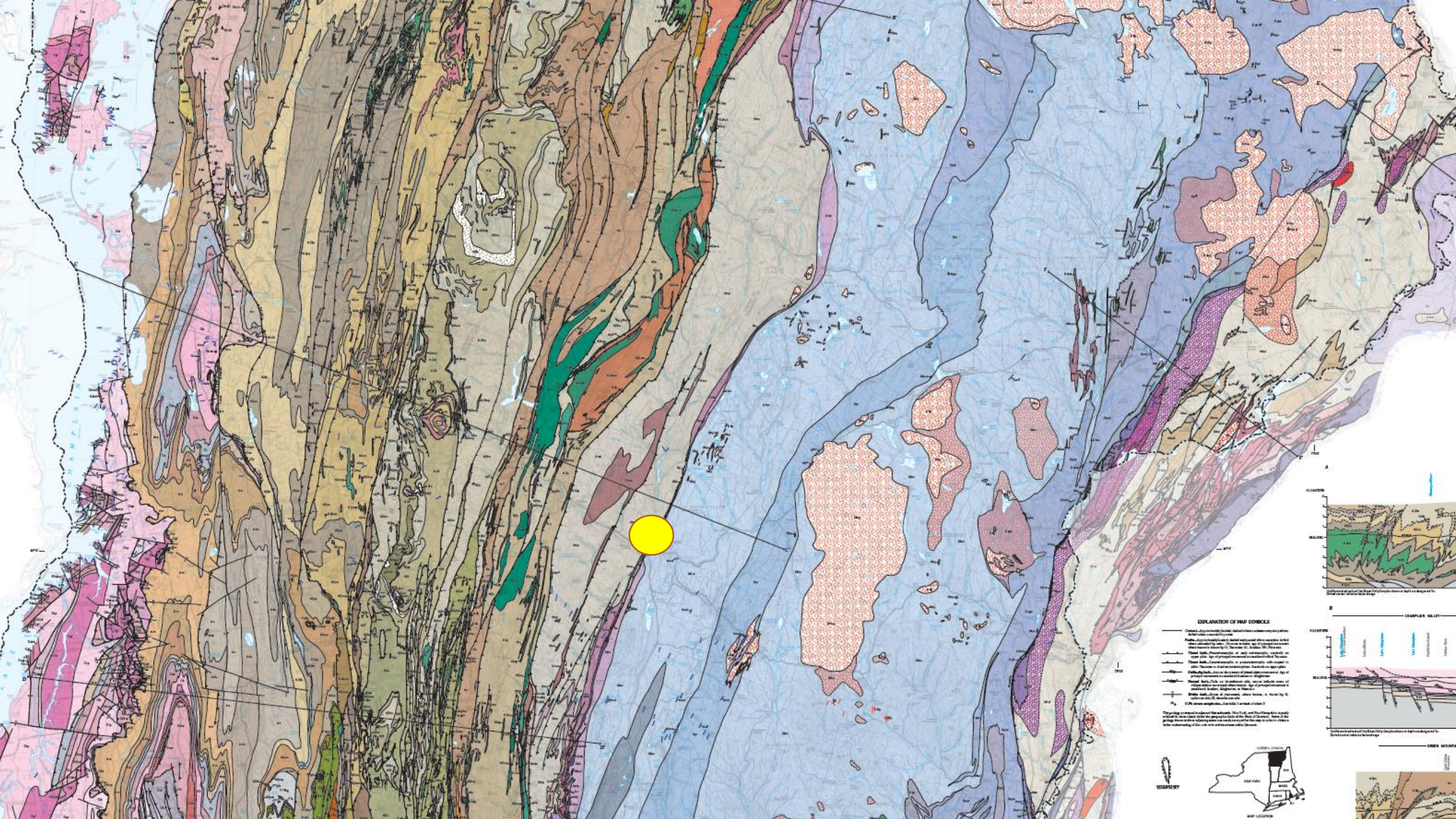

Montpelier
Continental Shelf
Iapetus Ocean
Ocean Floor

The Acadian Orogeny

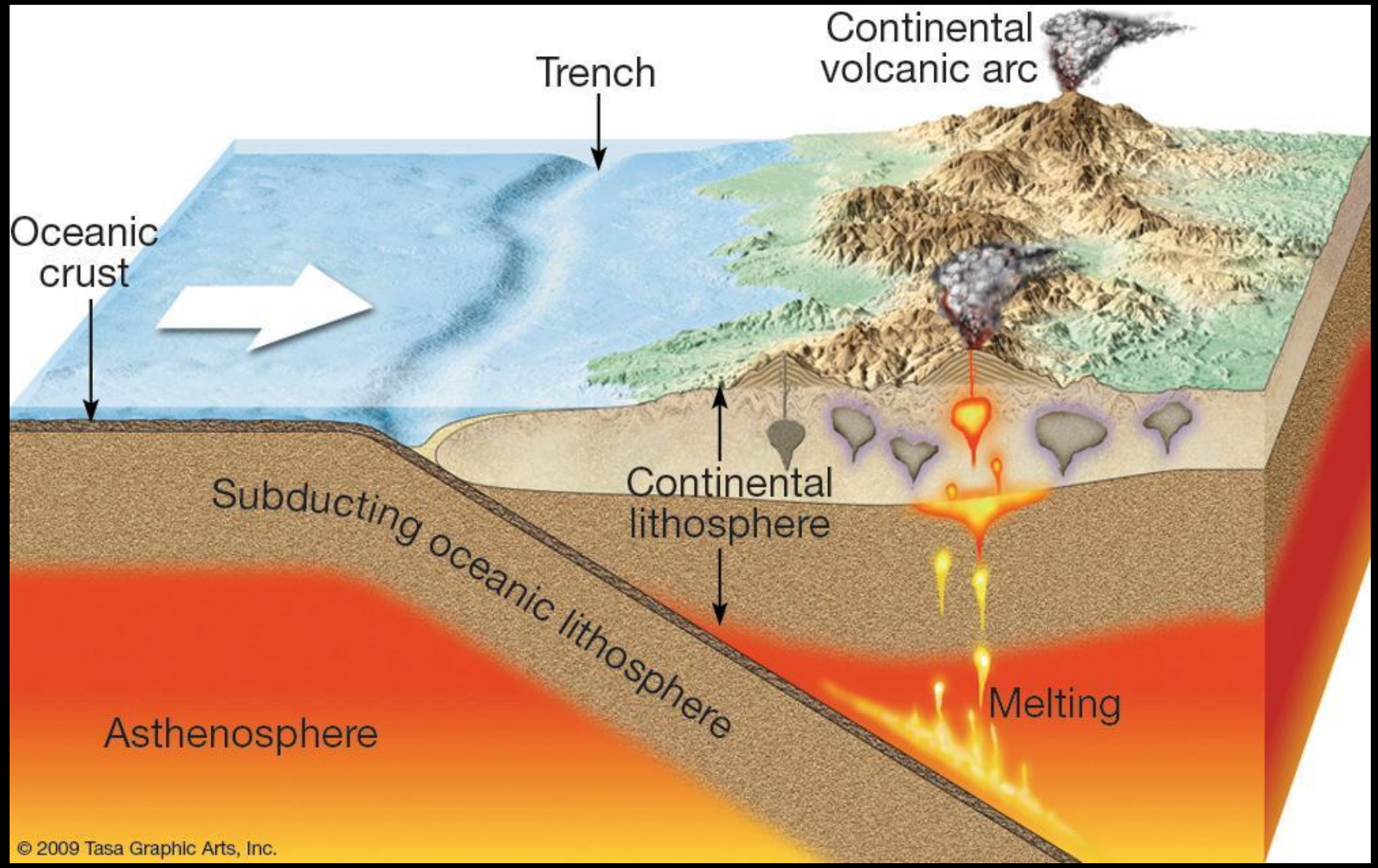
420 - 350 Million Years Ago (i)

Vermont Loses its Beachfront Views to Avalonia. Welcome, NH and ME!




EXPLANATION OF MAP SYMBOLS
CHAMPLAIN VALLEY
GREEN MOUNTAINS
MAP LOCATION

Acadian Orogeny: Sandy Limestone & Limey Standstone
Sediment Source: Volcanic Island Arc and Green Mountains erode into shallow Iapetus Ocean trough.
Waits River Formation

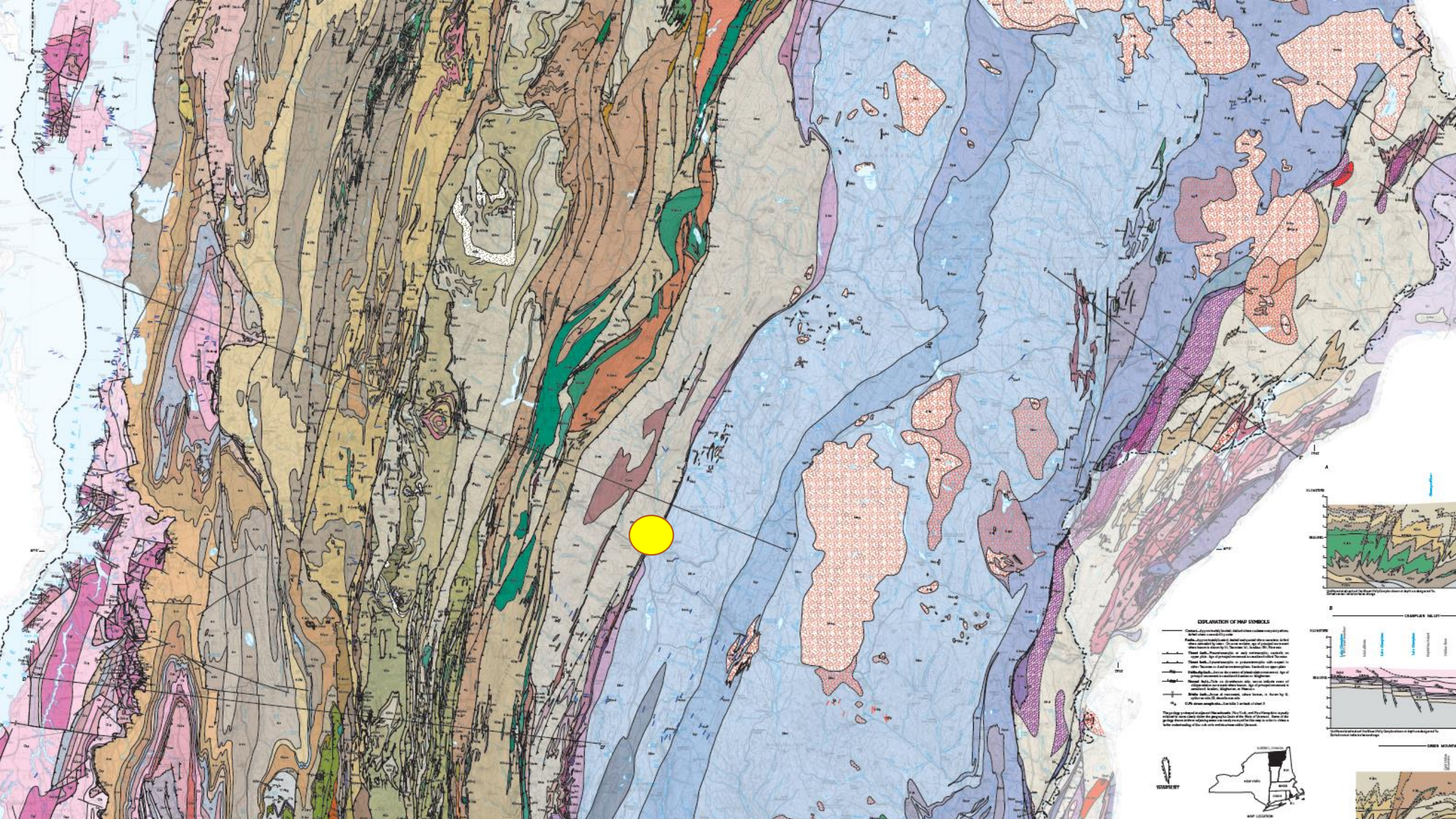

Continental
volcanic arc
Trench
Oceanic
crust
Continental
lithosphere
Subducting oceanic lithosphere
Melting
Asthenosphere
© 2009 Tasa Graphic Arts, Inc.

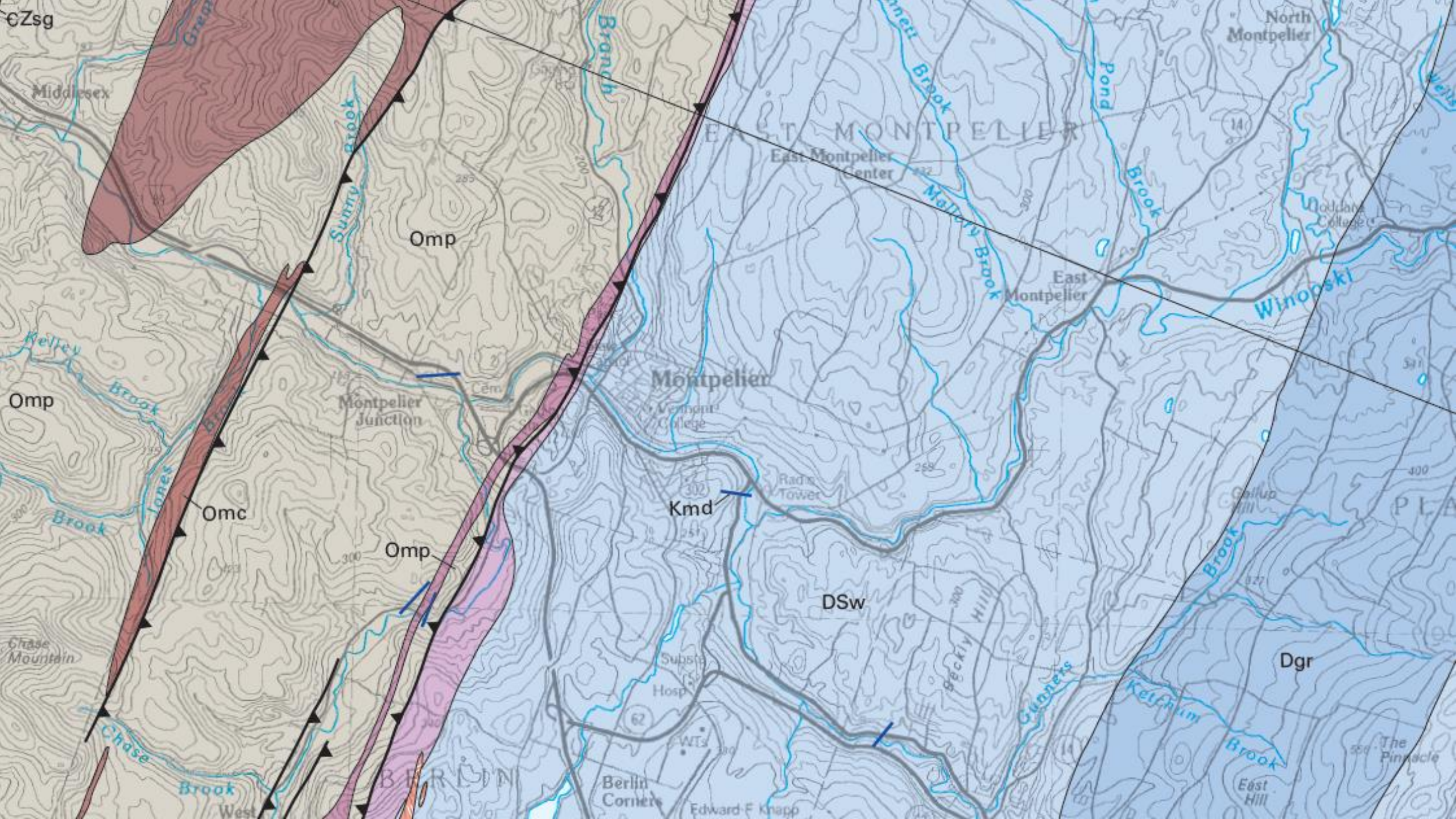
Act 1 Recap

Montpelier is at Vermont's Geologic Crossroads

Montpelier sits right along the suture between very different stories

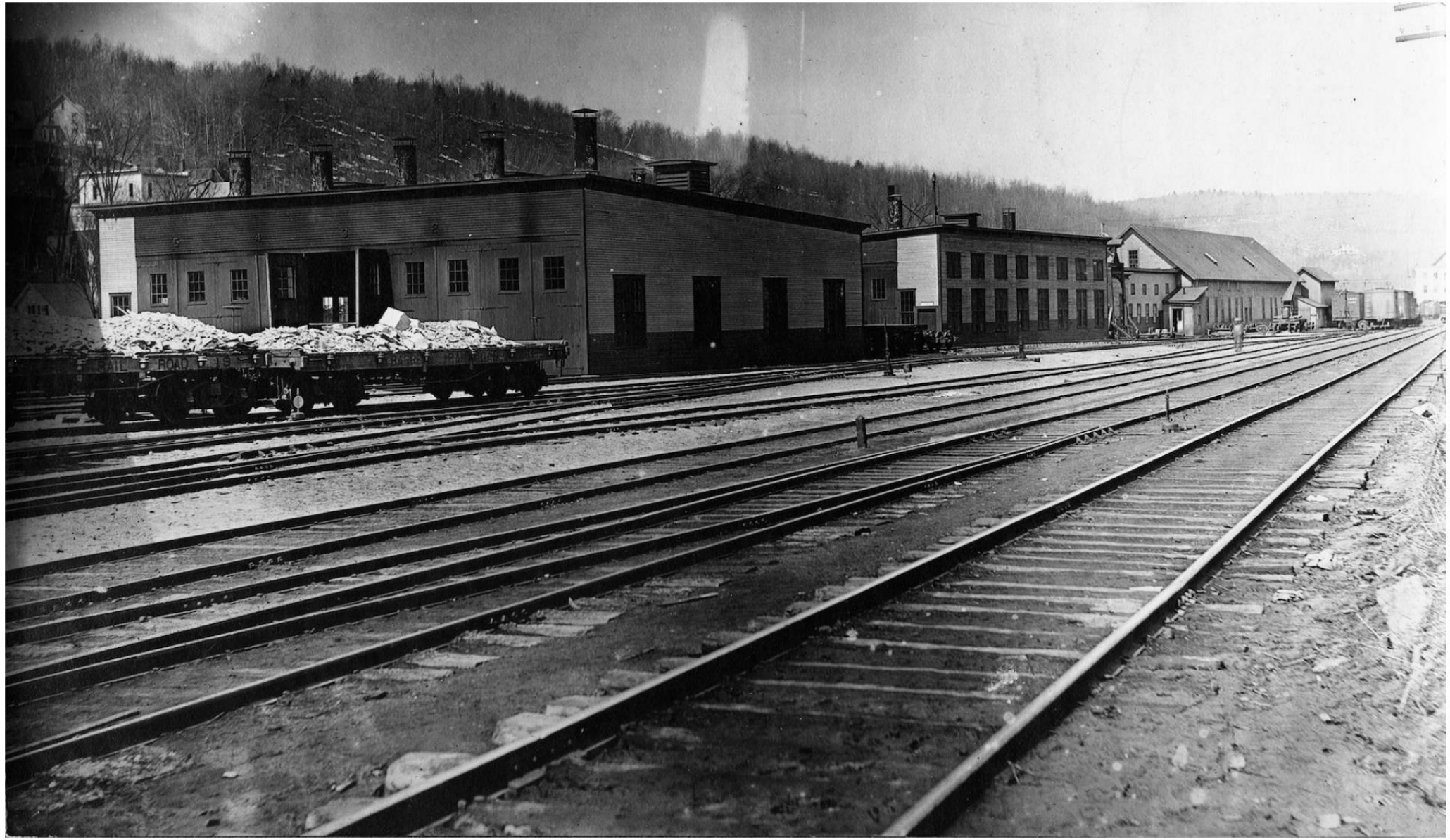
- To the west: Deep-water sediment, old, Green Mountains (Moretown Fm)
- To the east: shallow-water sediment, younger, richer (Waits River Fm)
- Granite scattered all around


EXPLANATION OF MAP SYMBOLS
CHAMPLAIN VALLEY
GREEN MOUNTAINS
MAP LOCATION


€Zsg
Middlesex
Omp
Omp
Omc
Omp
Kmd
DSw
Dgr
Montpelier
Montpelier Junction
Vermont College
East Montpelier
East Montpelier Center
North Montpelier
Berlin Corners
Edward F Knapp
Chase Mountain
Chase Brook
Kelley Brook
Jones Brook
Sunny Brook
Branch
Mallory Brook
Pond Brook
Winooski
Gunners Brook
Kelham Brook
Becky Hill
East Hill
The Pinnacle
Radio Tower
Hosp
WTs
Cem

West Berlin Granite Company

BLACK LIVES MATTER



Courtesy of the Vermont Historical Society

MYERS
MYERS
NO SMOKING WITHIN 15 FT OF BUILDING
We Liveme to Christ Church

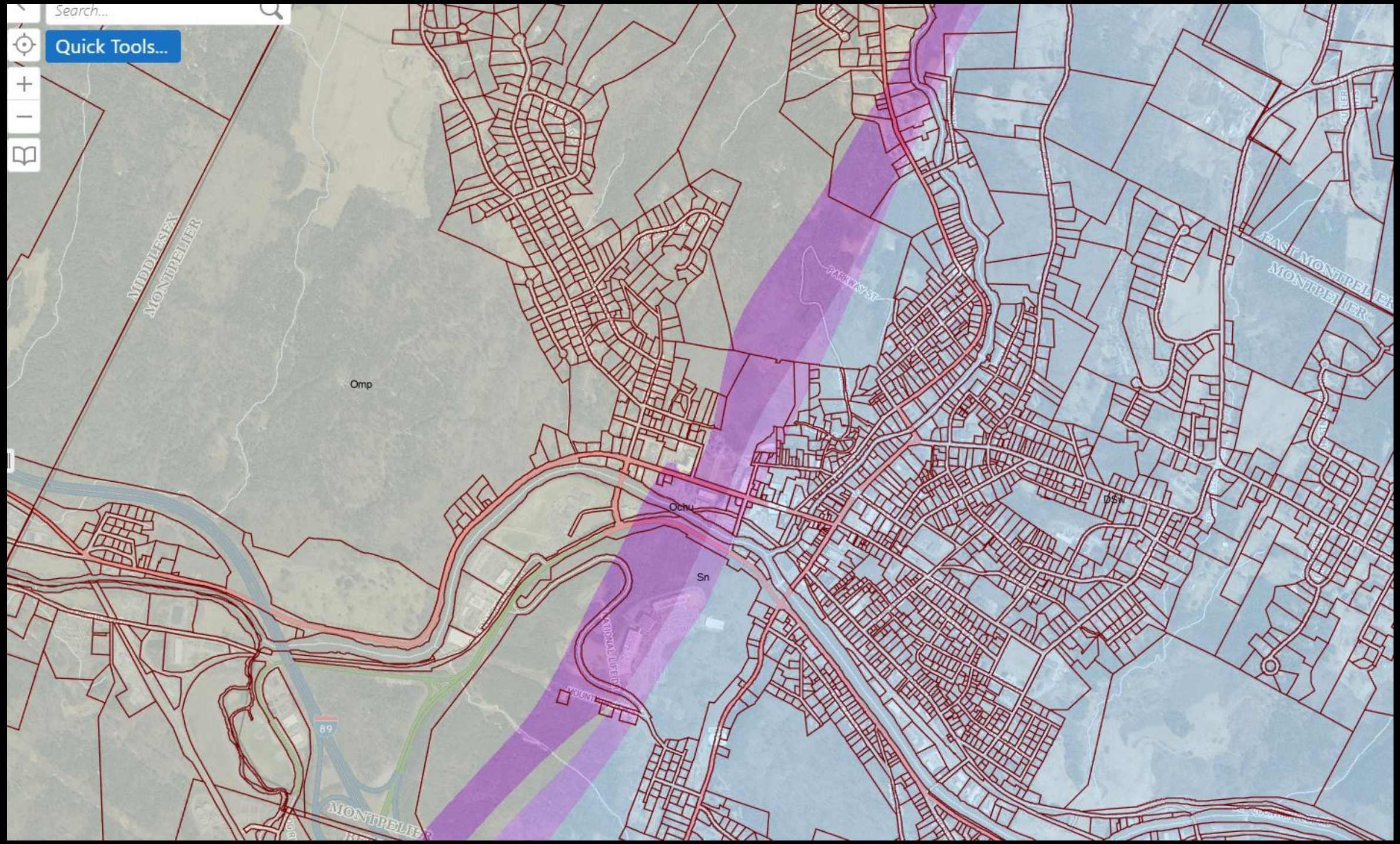
Courtesy: Golder Associates, 2005

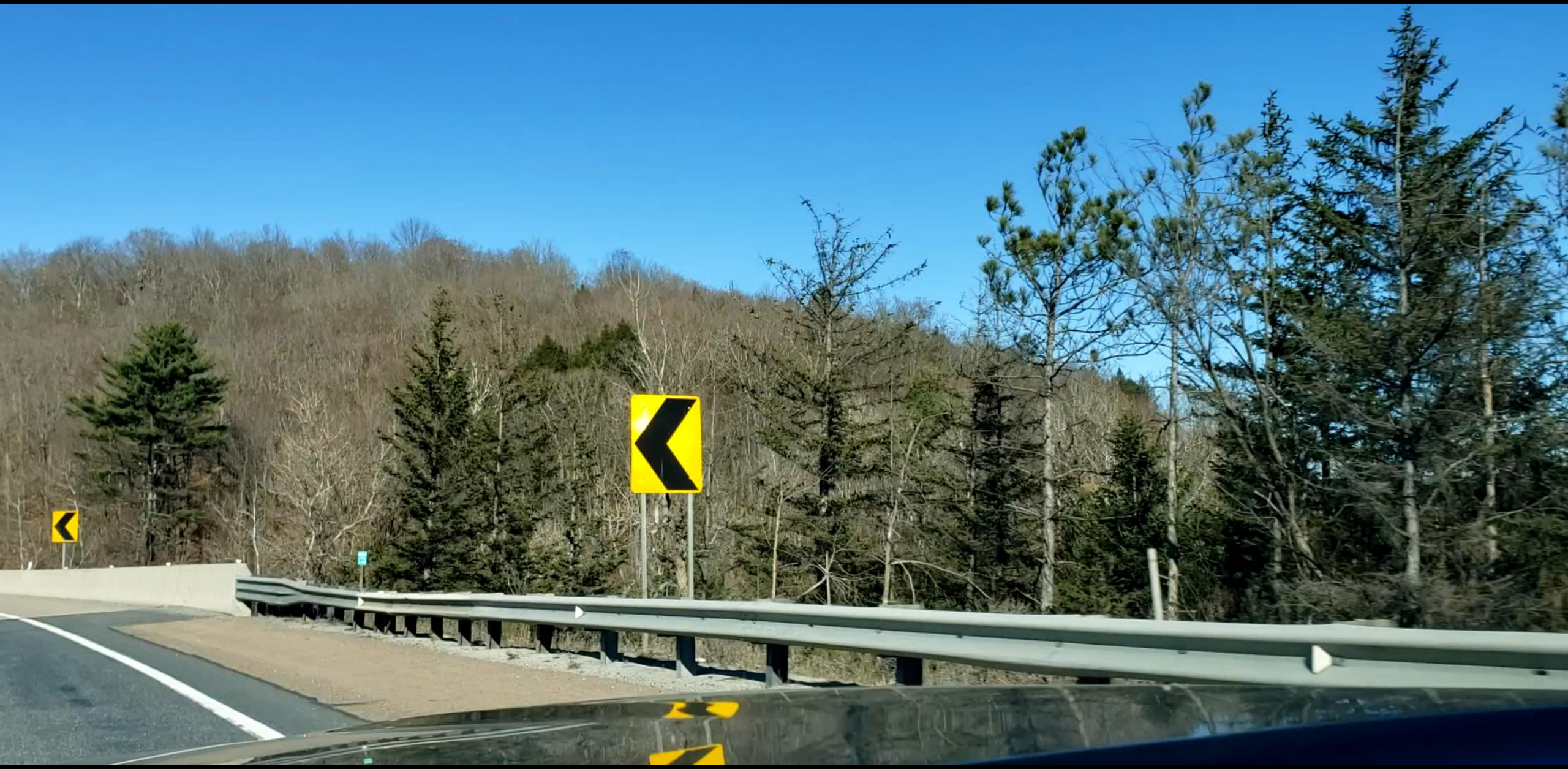
BEN
NAILS
BISTRO
STO

patagonia
cotopaxi

1868

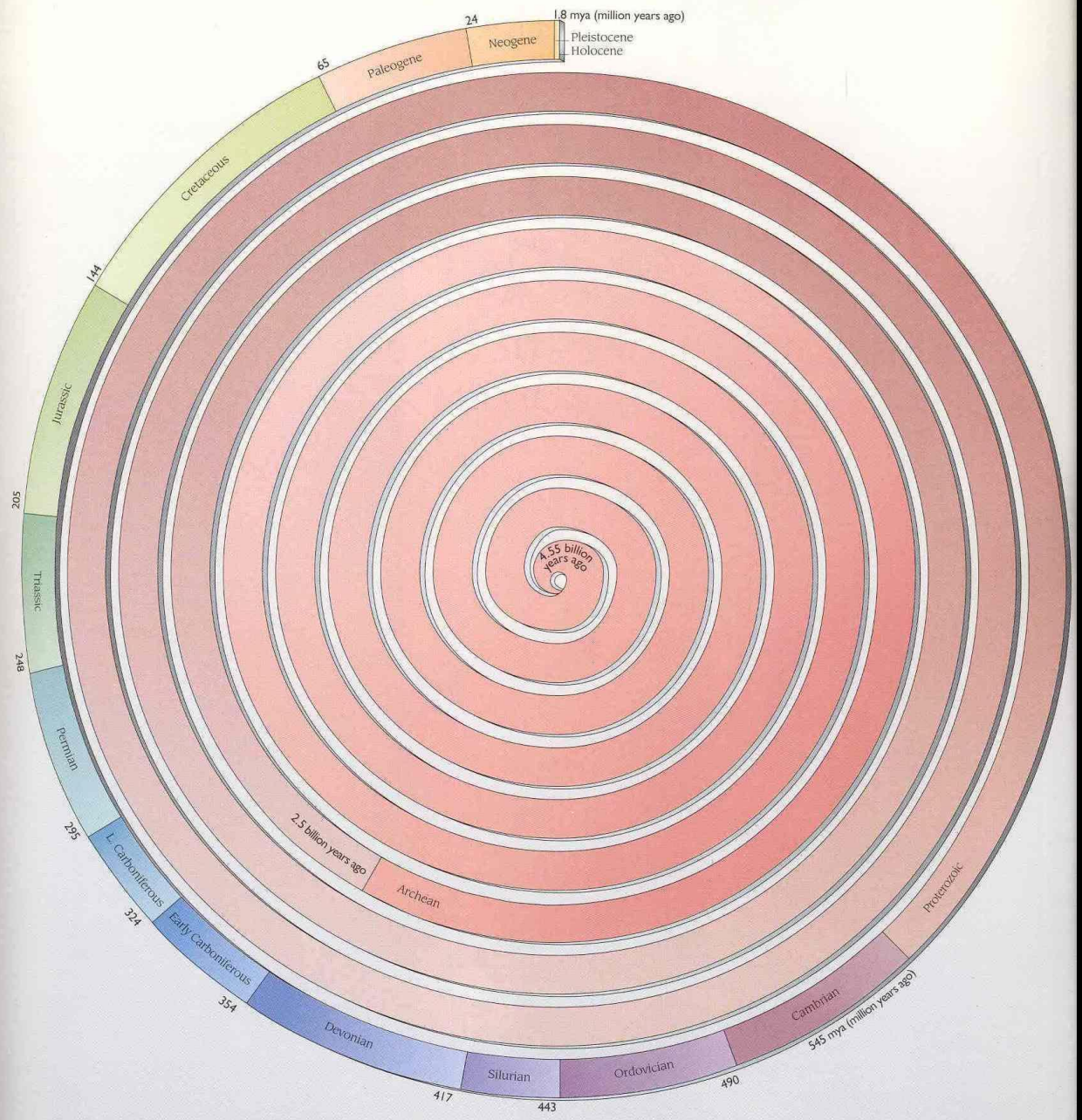
Wayne Fawbush ©


Search...
Quick Tools...
MIDDLESEX
MONTPELIER
Omp
Ochu
Sn
PARKWAY ST
EAST MONTPELIER
MONTPELIER
89



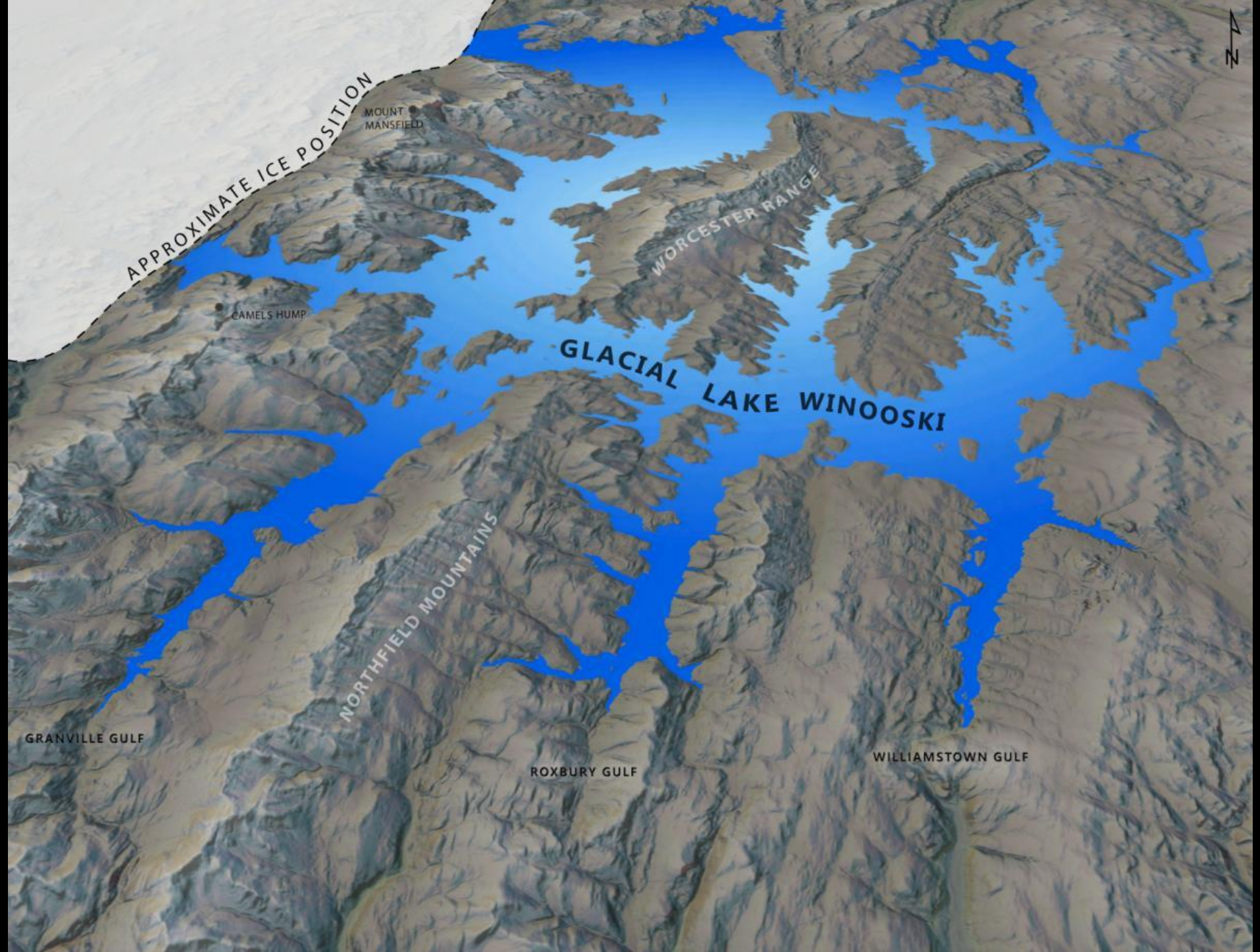
Act 2 The Glaciers:
(AKA “When The Earth is Flat”)

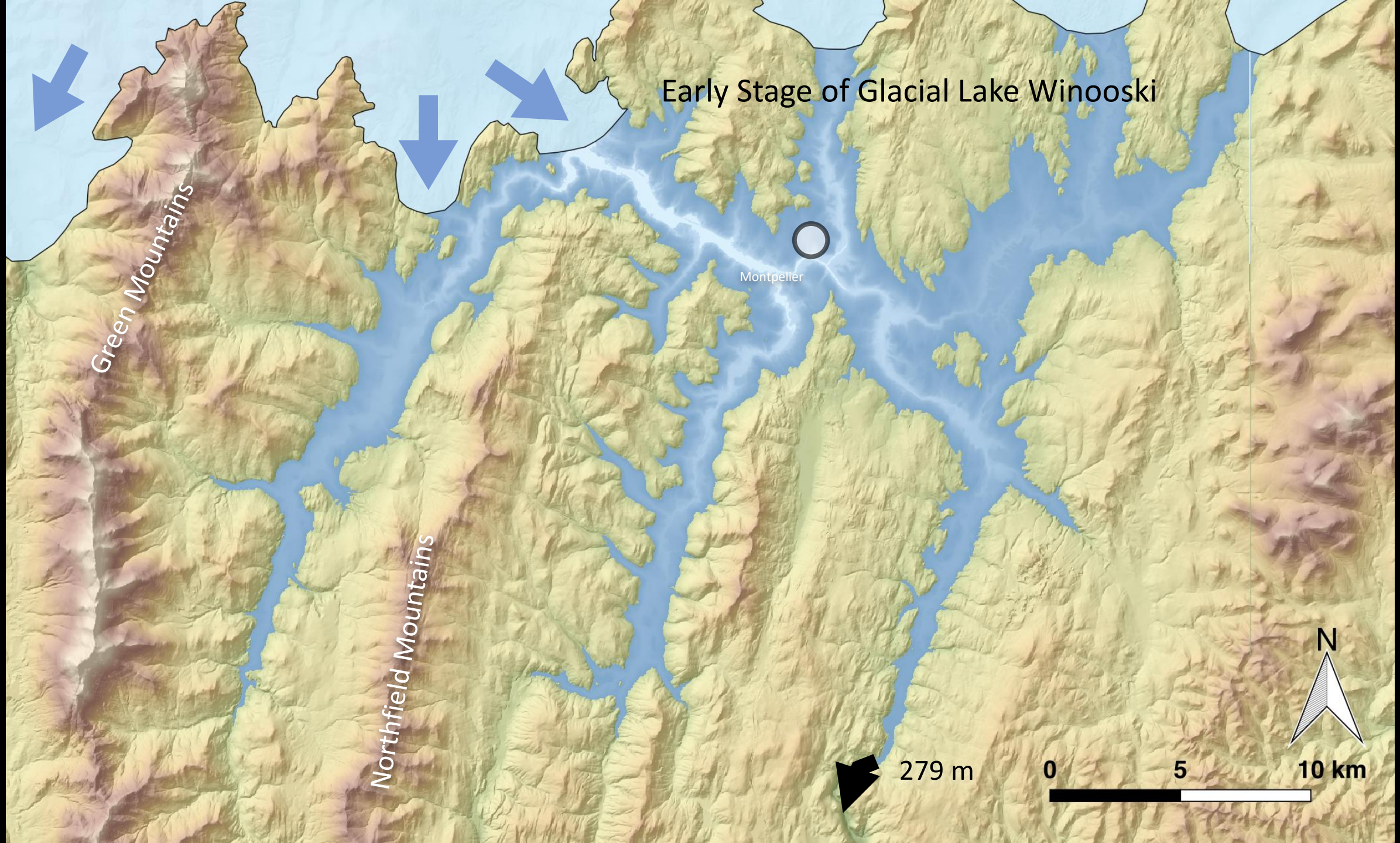
THE GEOLOGICAL TIMESCALE



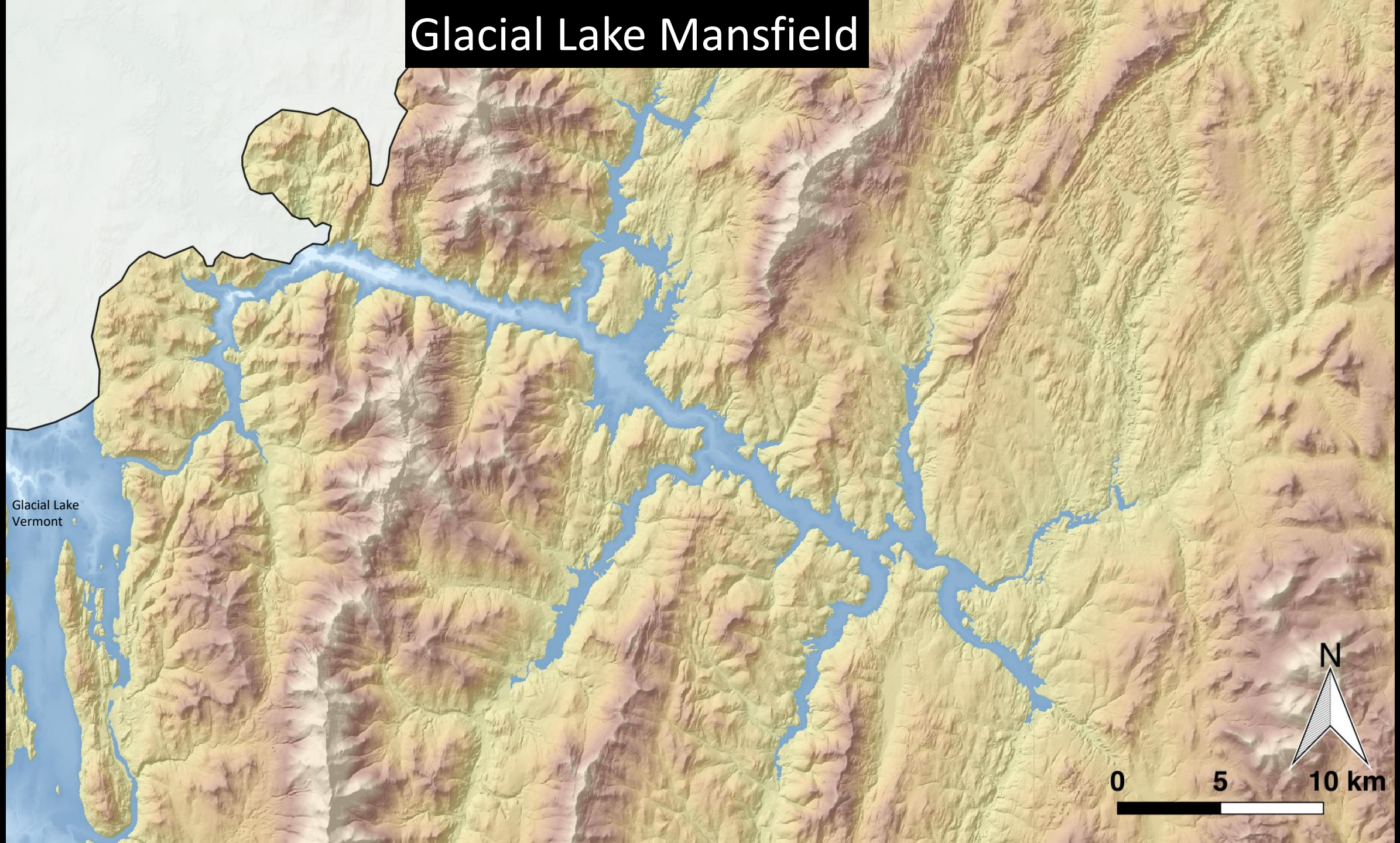
- **Laurentide Ice Sheet**
    - 2 million years ago to 10,000 years ago.
- Covered the whole continent.
- Glacial Maximum was 20,000 years ago.
- Covered Vermont until about 14,000 years ago in ice a mile thick.

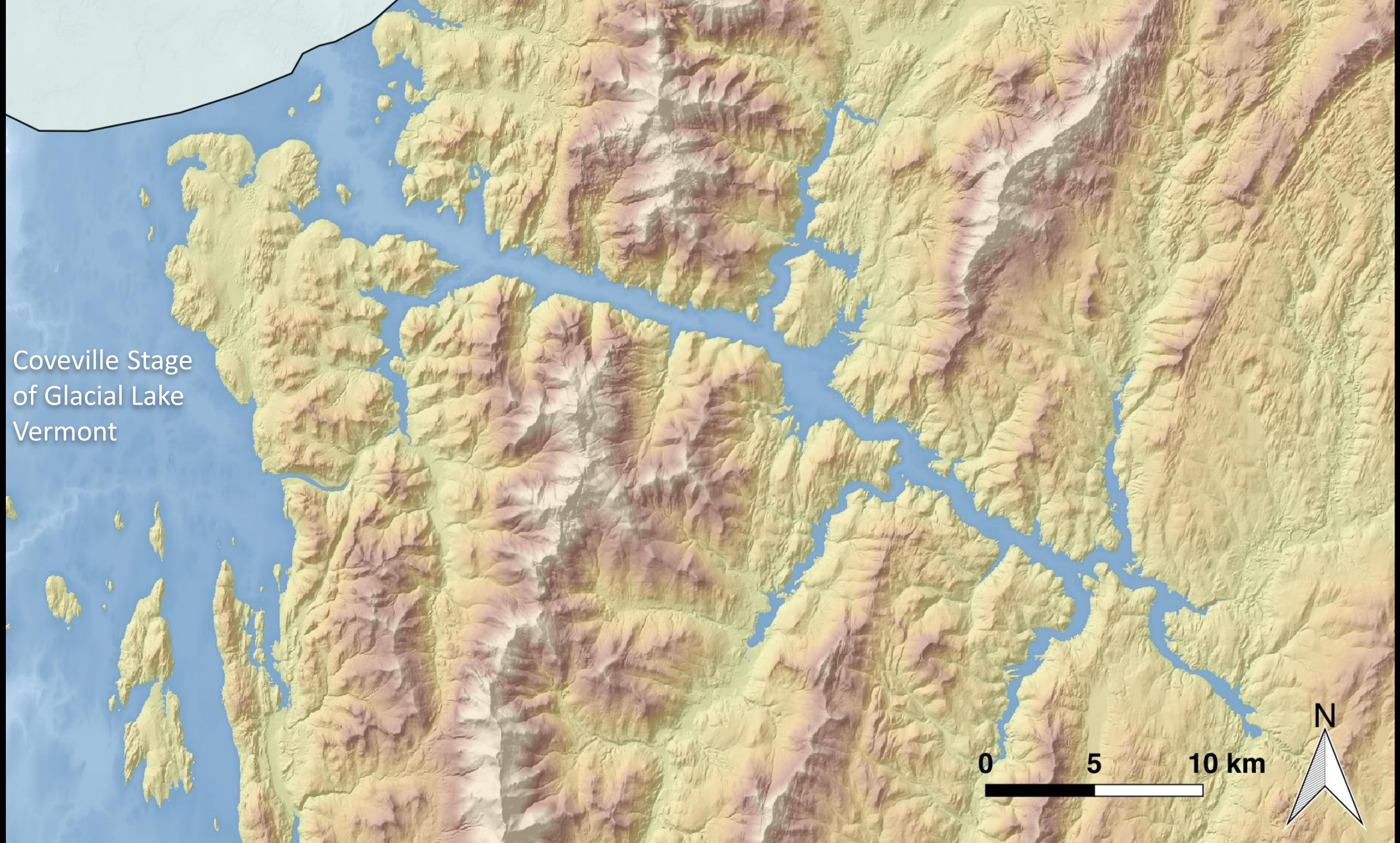
Google Earth

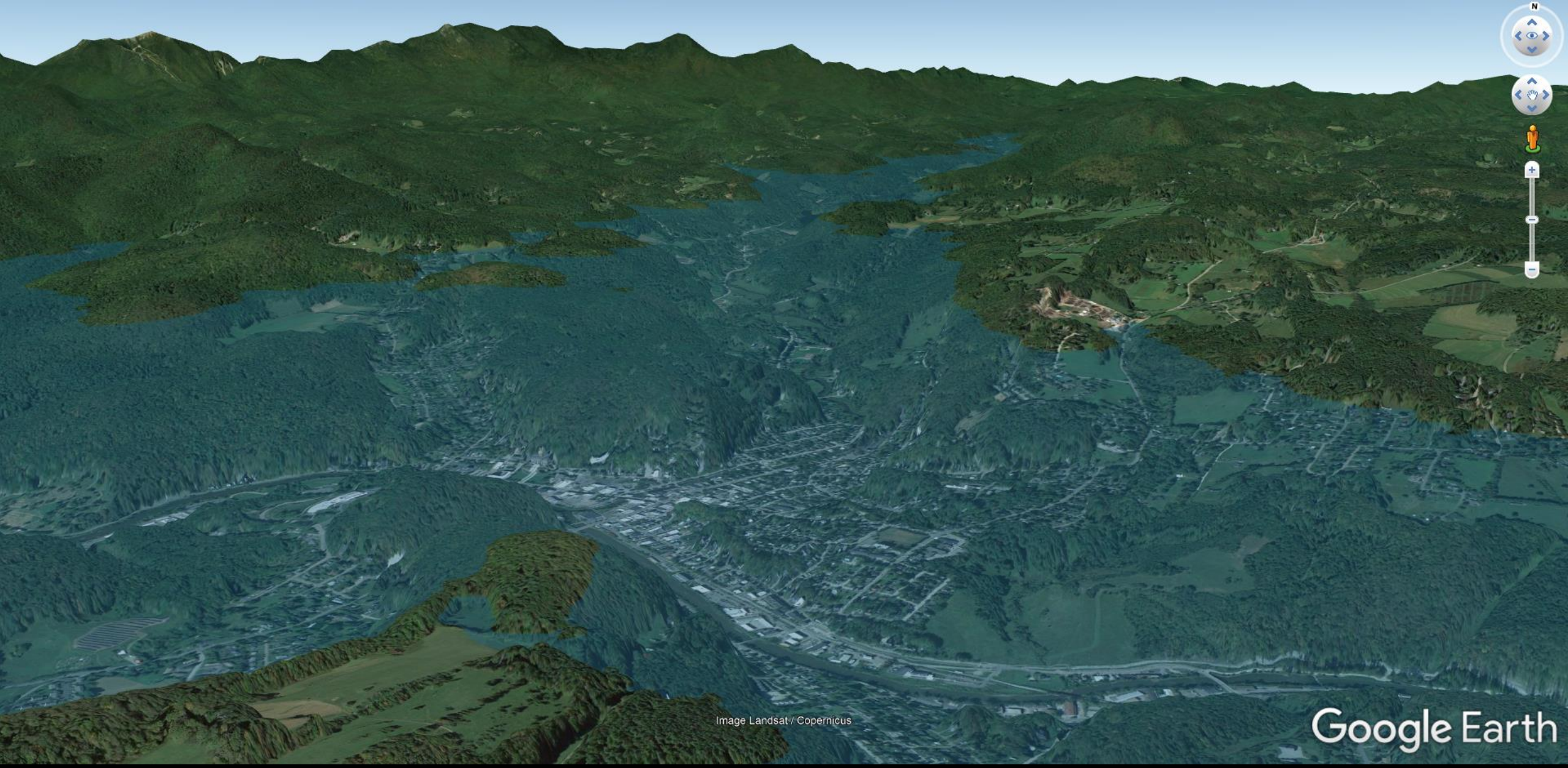

APPROXIMATE ICE POSITION
MOUNT MANSFIELD
CAMELS HUMP
WORCESTER RANGE
GLACIAL LAKE WINOOSKI
NORTHFIELD MOUNTAINS
GRANVILLE GULF
ROXBURY GULF
WILLIAMSTOWN GULF
N


Early Stage of Glacial Lake Winooski
Green Mountains
Northfield Mountains
Montpelier
279 m
0
5
10 km
N

Glacial Lake Mansfield




Coveville Stage
of Glacial Lake
Vermont
0
5
10 km
N

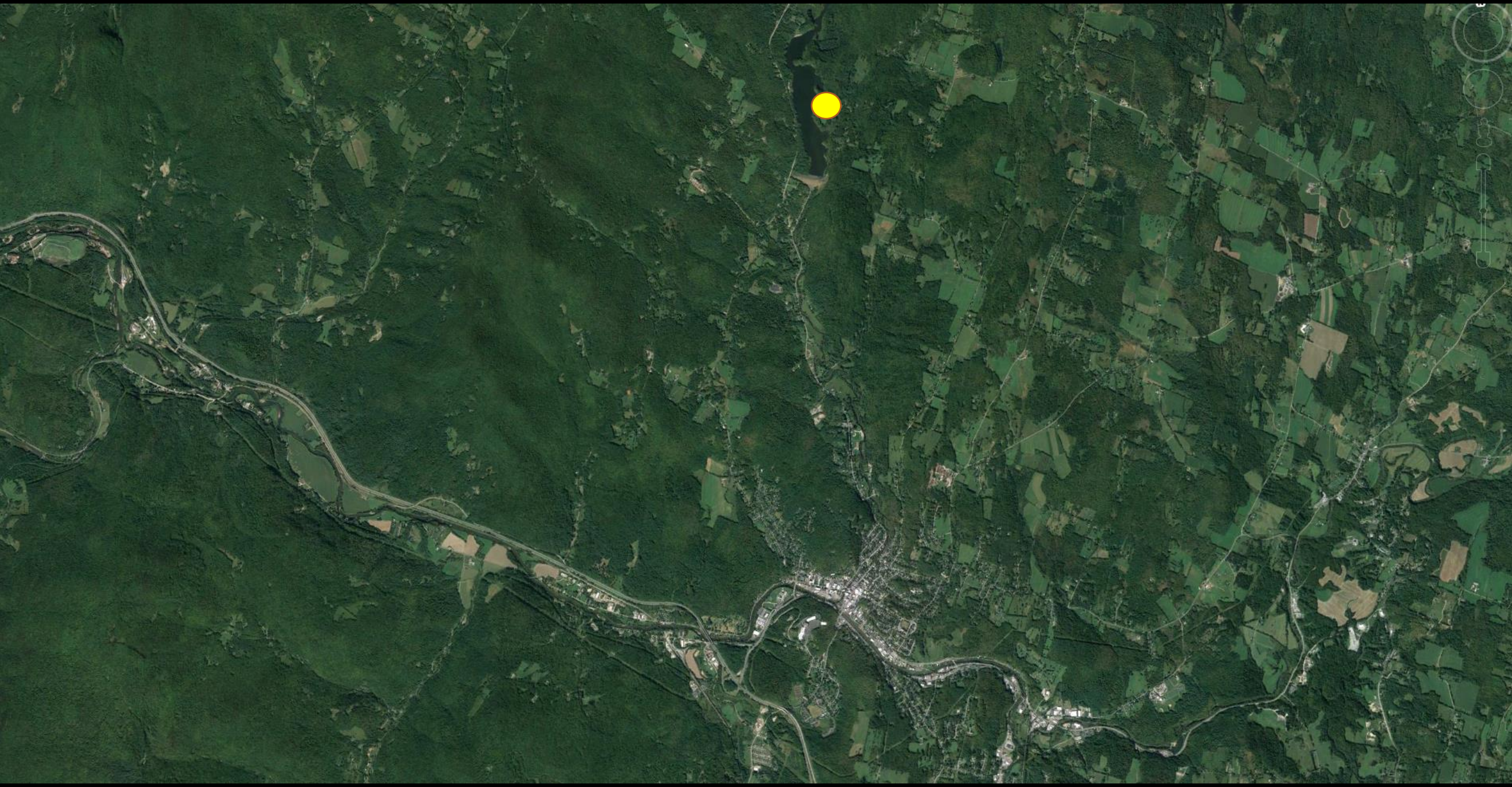


Glacial Lake Winooski (14,100 to 13,800 years ago; ~900 ft asl)

Glacial Lake Mansfield (13,800 to 13,500 years ago; ~700 ft asl)

Glacial Lake Vermont (13,500 to 13,000 years ago; ~575 ft asl)

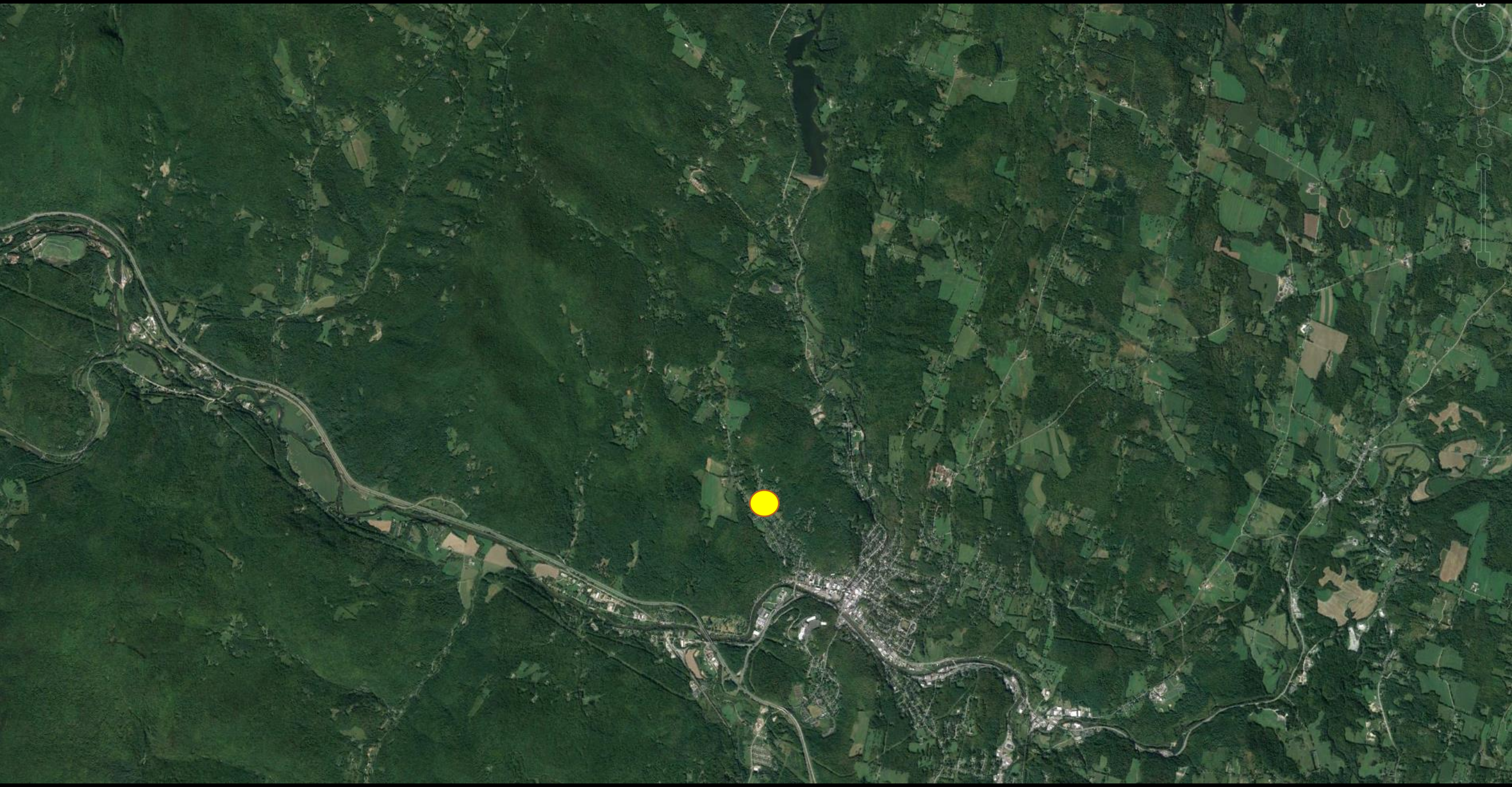
625 ft asl



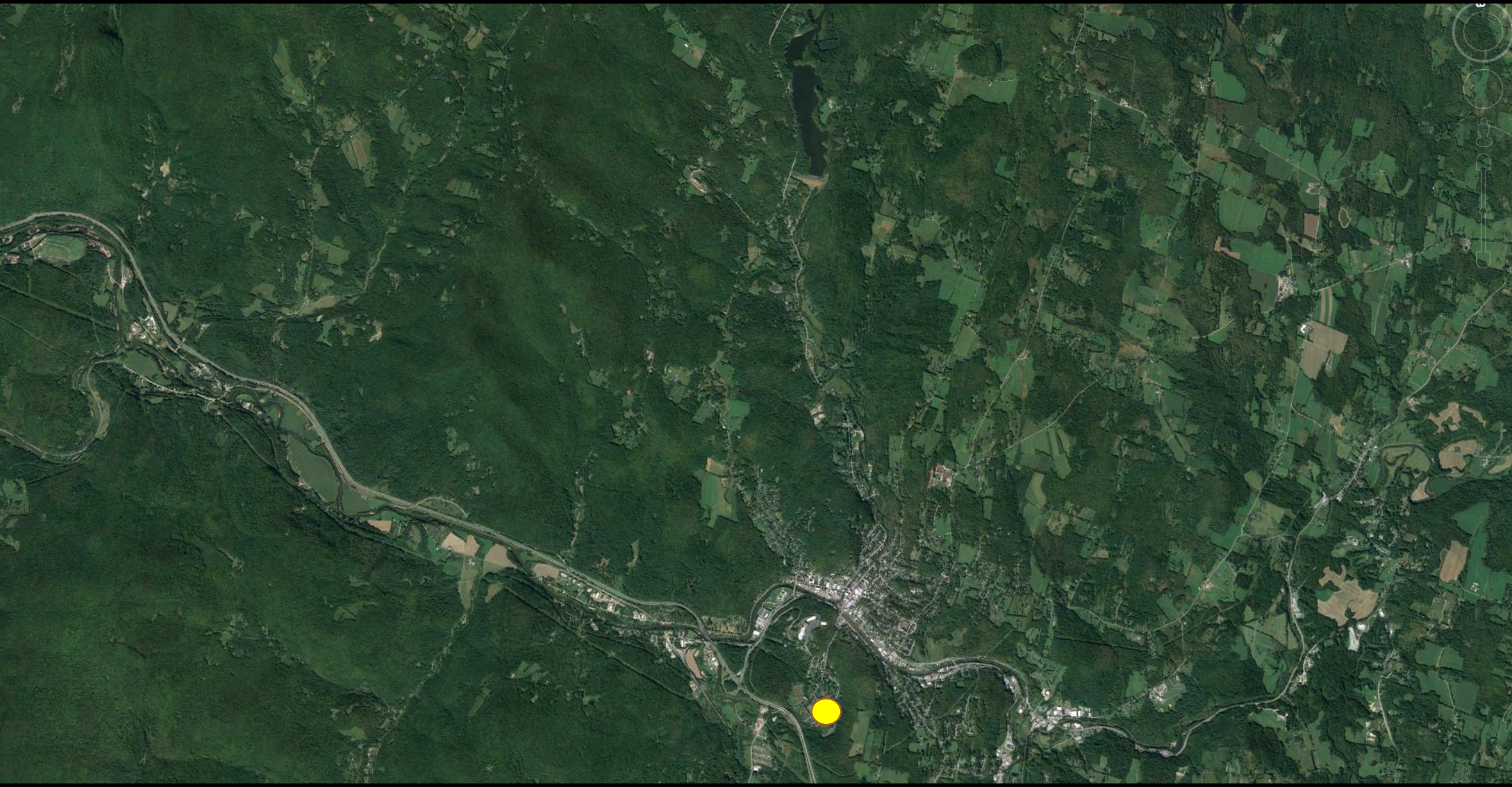
701 ft asl

COLLINS
BROMLEY

701 ft asl



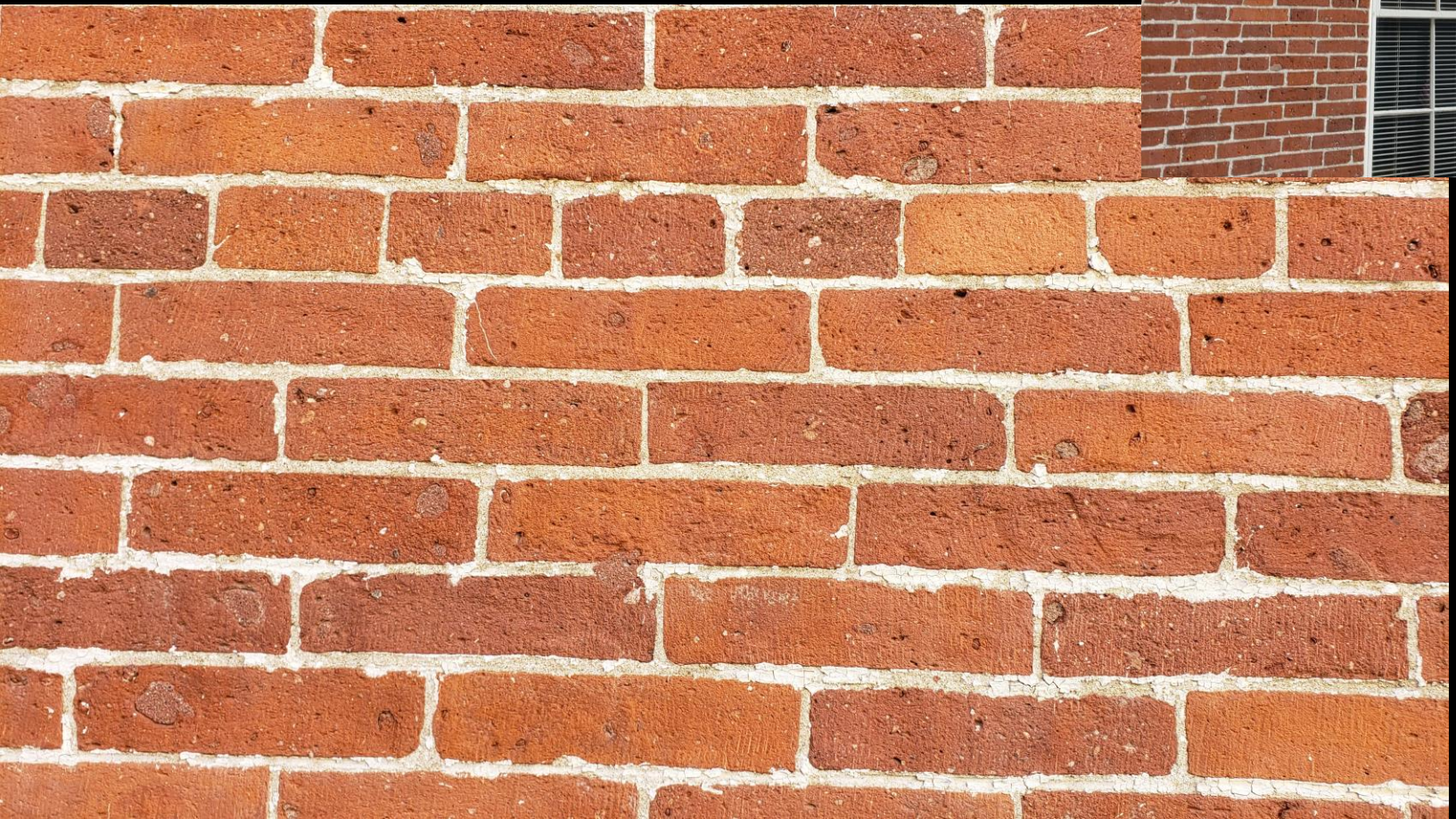
650-700 ft asl

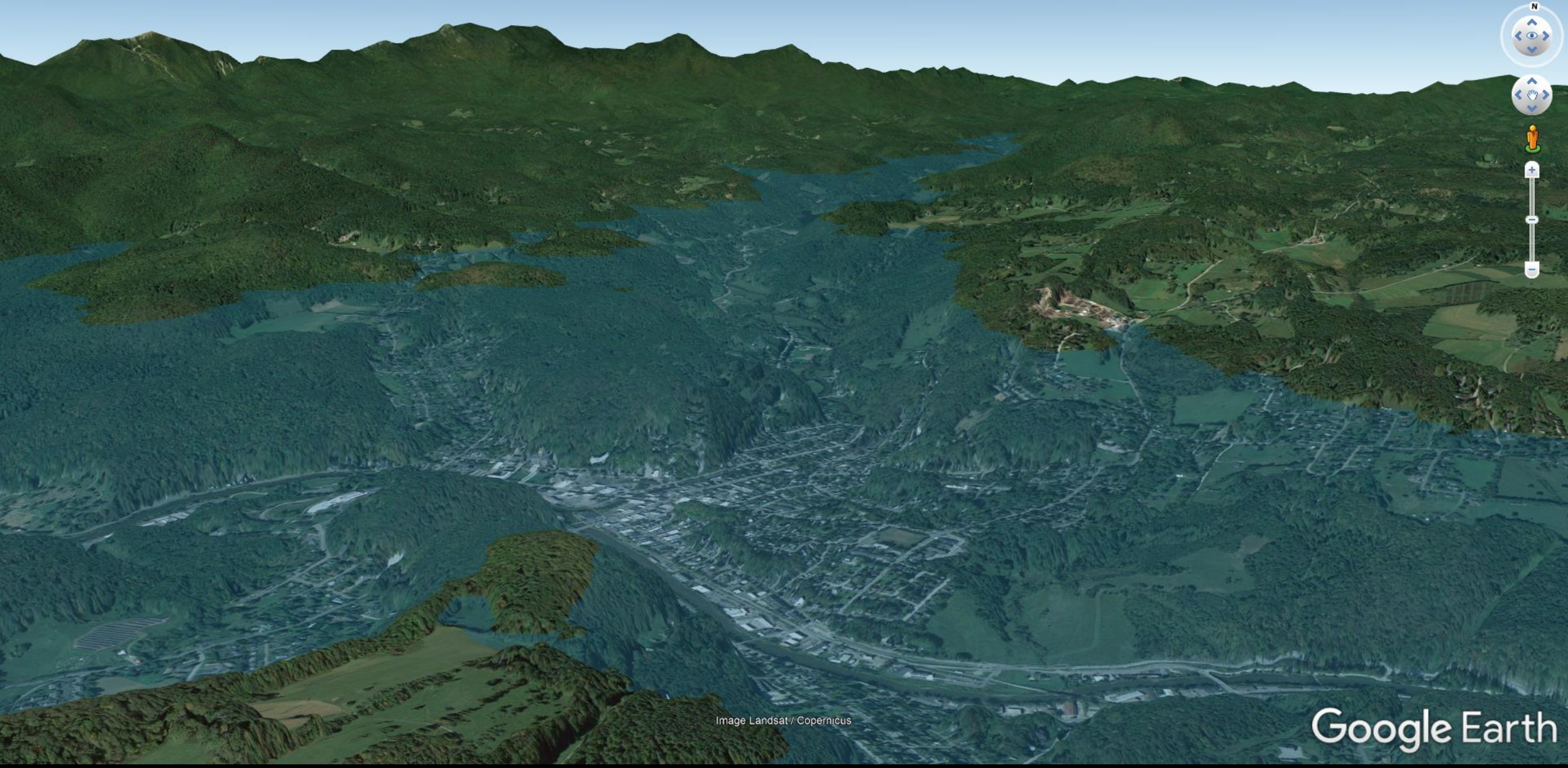


695 ft asl

EMERGENCY SIGNAL
DO NOT BLOCK FIRE STATION
WEST
NORTH
KINNEY DRUG
Splash
Kellogg-Hubbard Library
VT College of Fine Arts
Capitol District
CAPITOL STATIONERS
SINCE 1950
SOUVENIRS • OFFICE SUPPLIES • GIFTS
Hallmark Cards
CAPITOL STATIONERS
MONTPELIER FIRE DEPARTMENT

1826





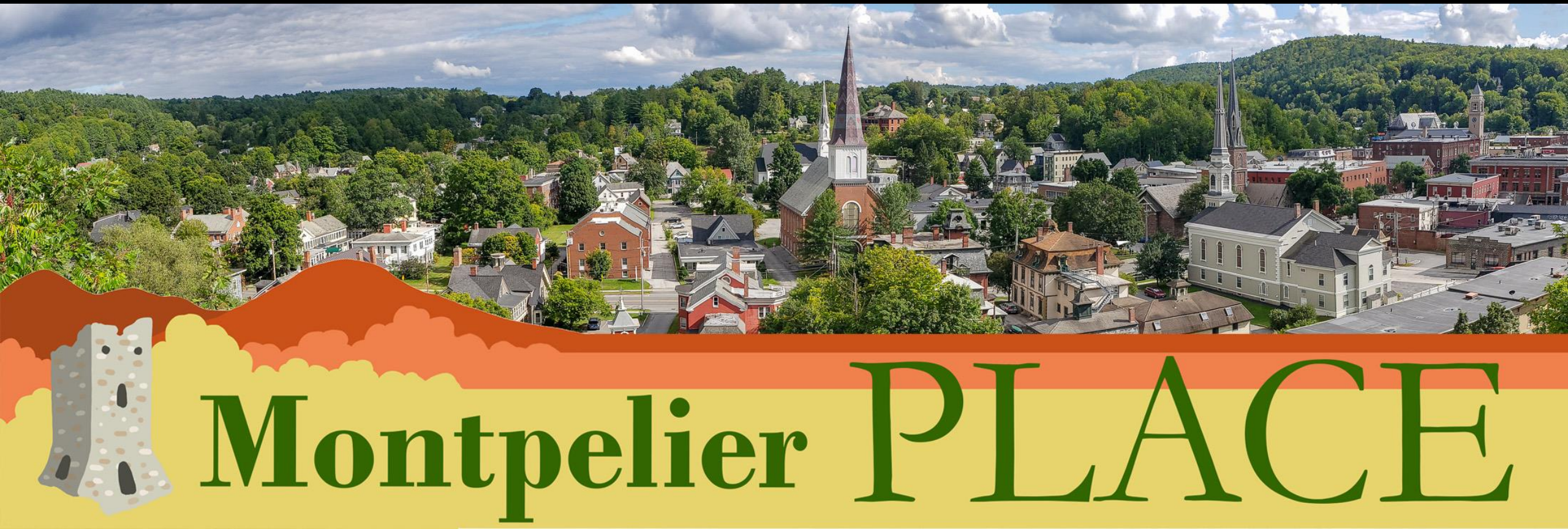
Glacial Lake Winooski (14,100 to 13,800 years ago; ~900 ft asl)

RIALTO BUILDING
38

BLACK
RIVER
DESIGN
ARCHITECTS

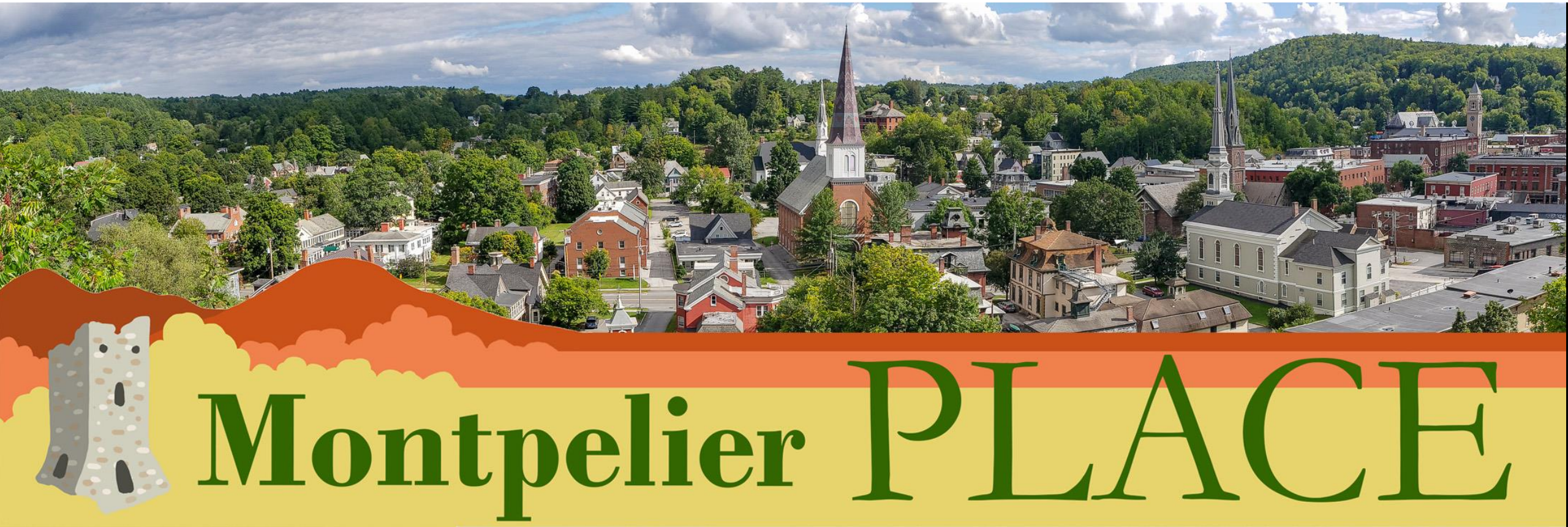
Thanks To:

- Stephen Wright, George Springston, Marjorie Gale, VT Geological Survey
- Charles Johnson: “The Nature of Vermont” Orogeny Illustrations
- Walter Poleman: geology diagrams
- Claire Dacey
- Hunger Mountain Coop | Ben & Jerry’s Foundation | Vermont Community Fund

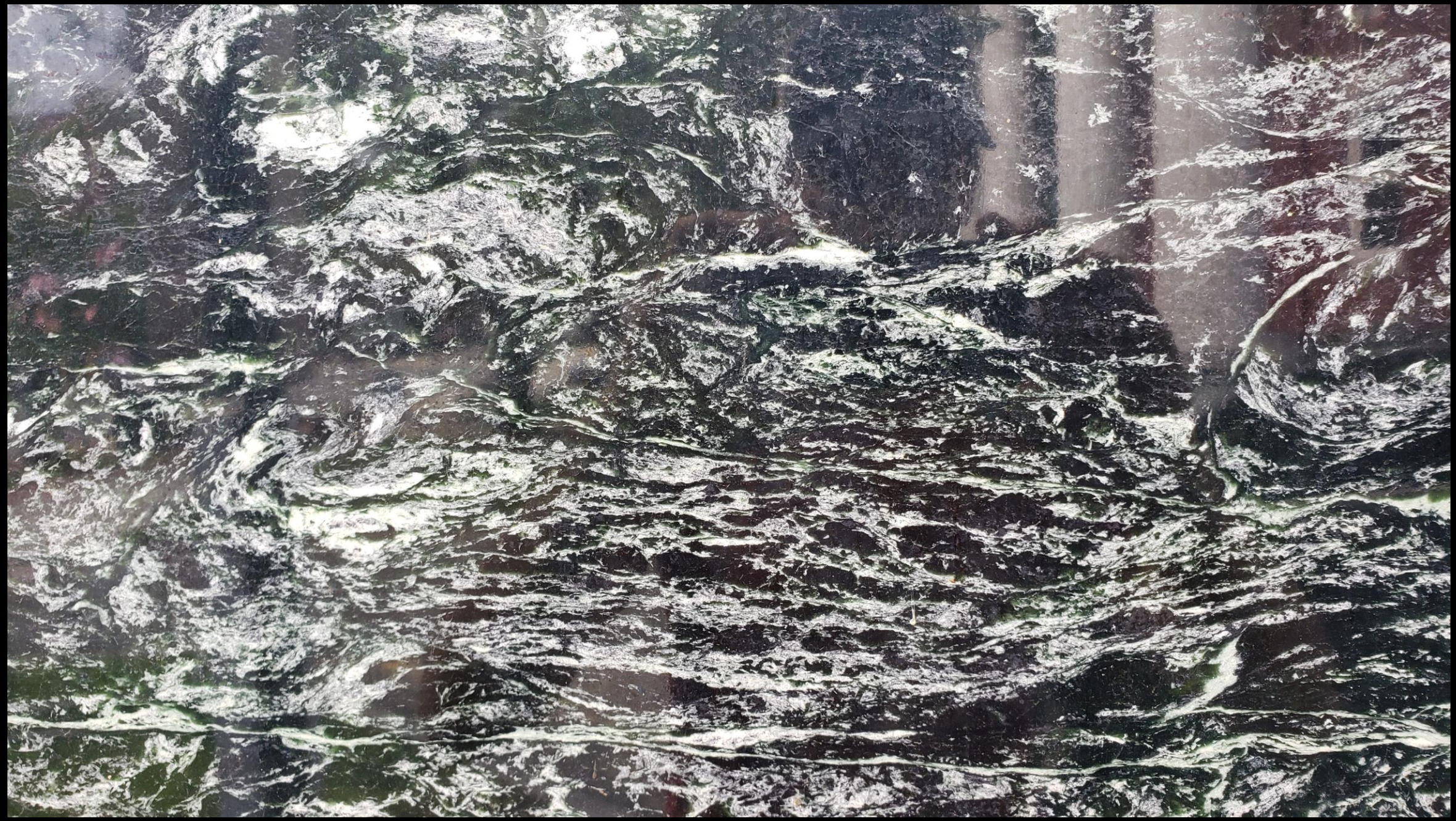


Montpelier Underfoot

Sean Beckett
North Branch Nature Center
Sean@NorthBranchNatureCenter.org



FEDERAL BUILDING
UNITED STATES POST OFFICE
UNITED STATES COURT HOUSE
MONTPELIER, VERMONT
ANNUIT CŒPTIS
NOVUS ORDO SECLORUM



- Mud
- Shale
- Slate
- Phyllite
- Schist